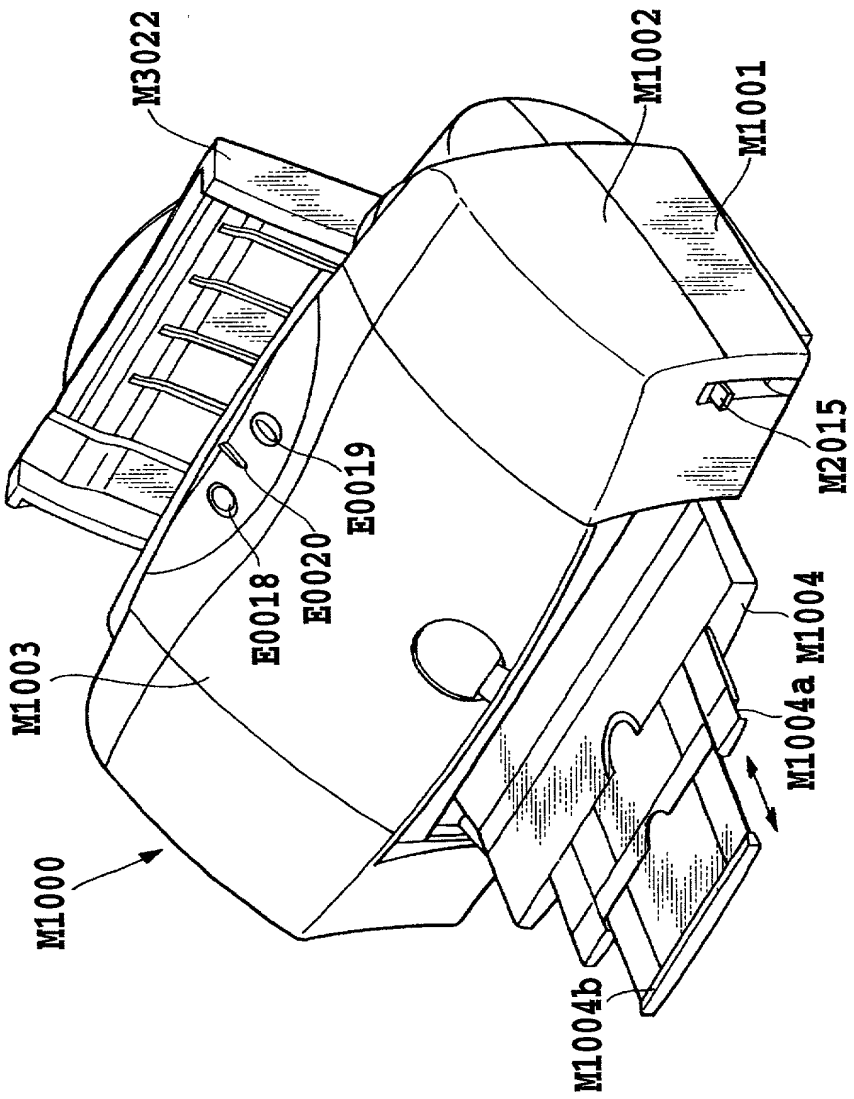

M3022
M1002
M1001
E0019
E0018
E0020
M2015
M1003
M1004
M1004a
M1000
M1004b

FIG.1

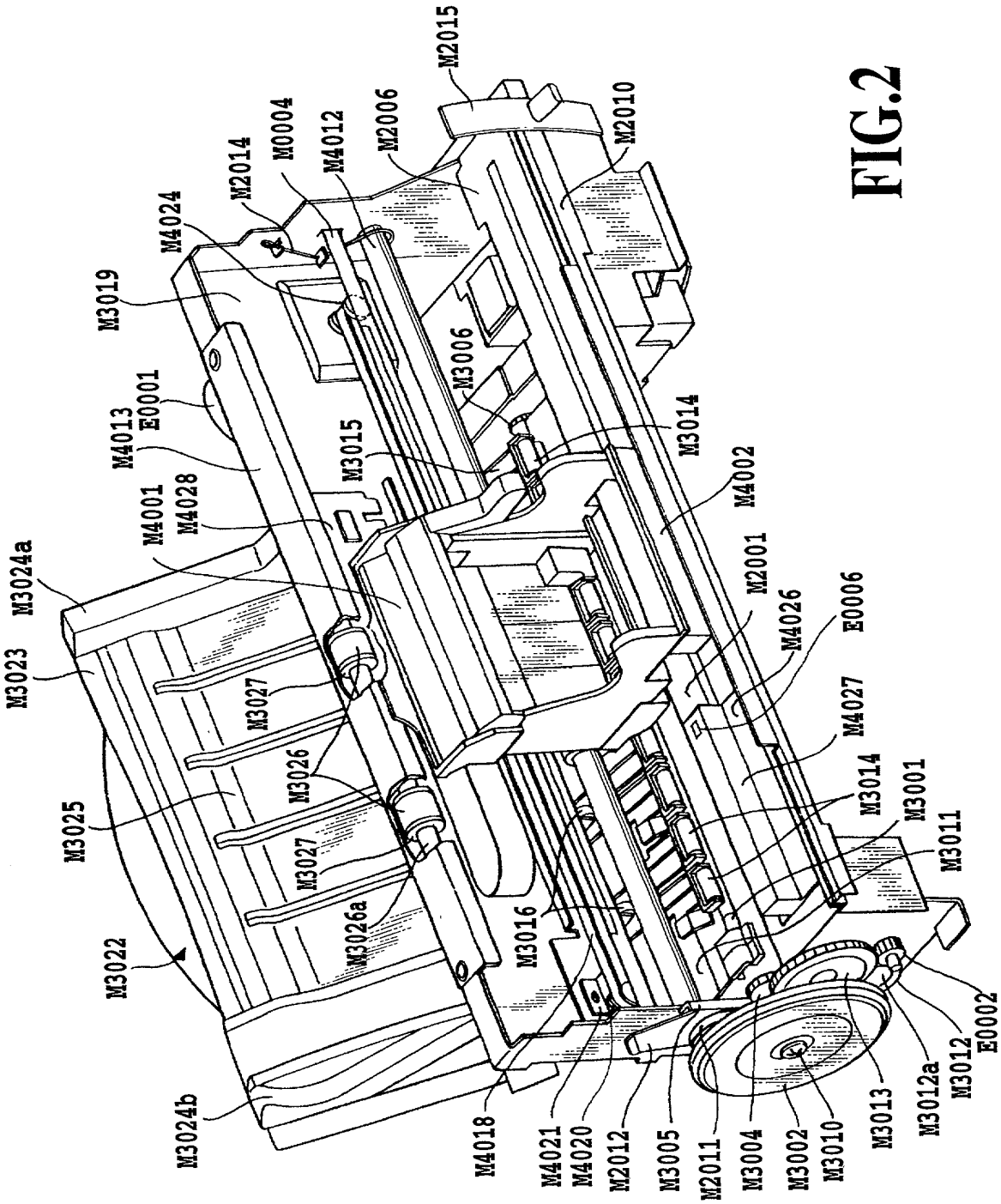

M2015
M2010
M0004
M4012
M2006
M2014
M4024
M3019
M3006
M4013
E0001
M3015
M3014
M4001
M4028
M4002
M3024a
M3023
M2001
M4026
E0006
M3027
M4027
M3026
M3014
M3001
M3025
M3027
M3011
M3026a
M3016
M3022
E0002
M3012
M3012a
M3024b
M3013
M4018
M3010
M3002
M4021
M4020
M3004
M2012
M2011
M3005

FIG.2

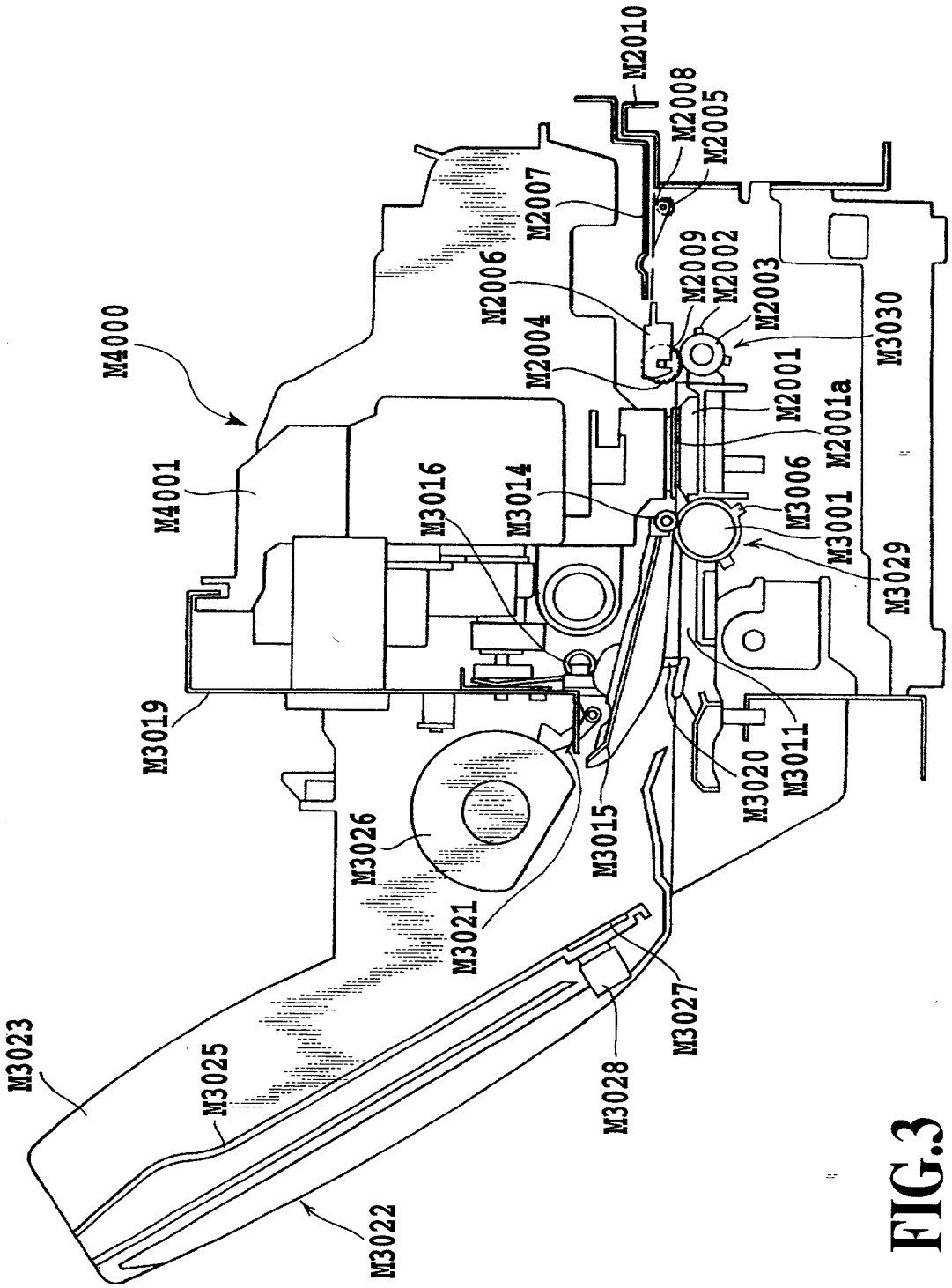

M4000
M4001
M3019
M3023
M3025
M3022
M3026
M3021
M3016
M3014
M3015
M3027
M3028
M2006
M2007
M2010
M2008
M2005
M2009
M2002
M2003
M2004
M2001
M2001a
M3030
M3006
M3001
M3029
M3020
M3011

FIG.3

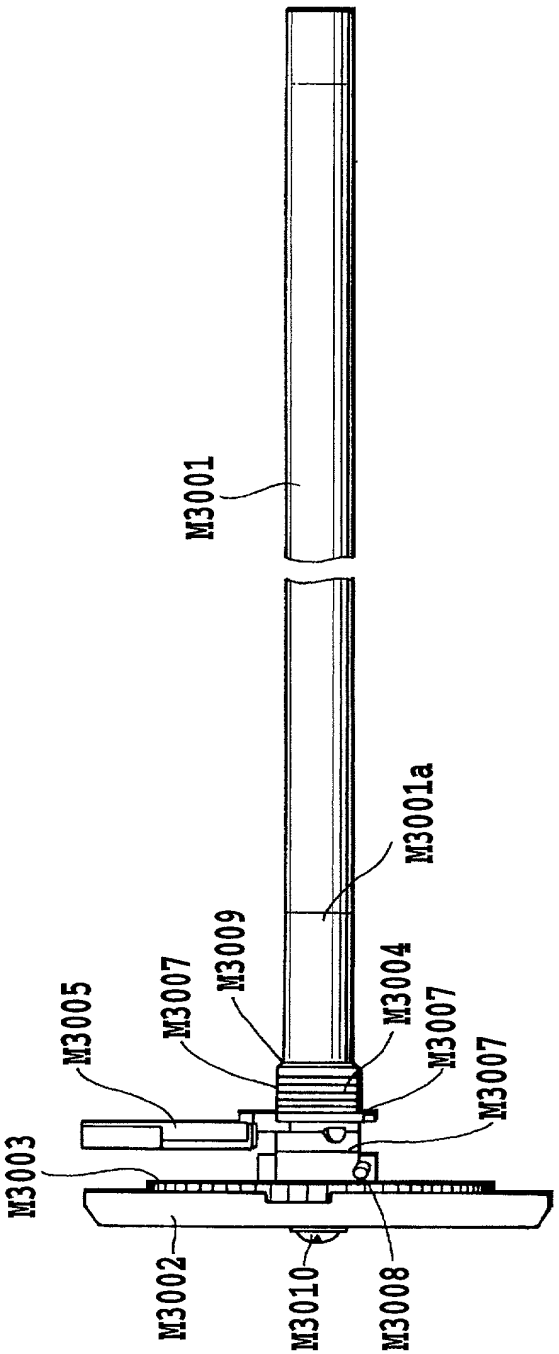

M3001
M3001a
M3009
M3007
M3004
M3007
M3007
M3005
M3003
M3002
M3010
M3008

FIG.4

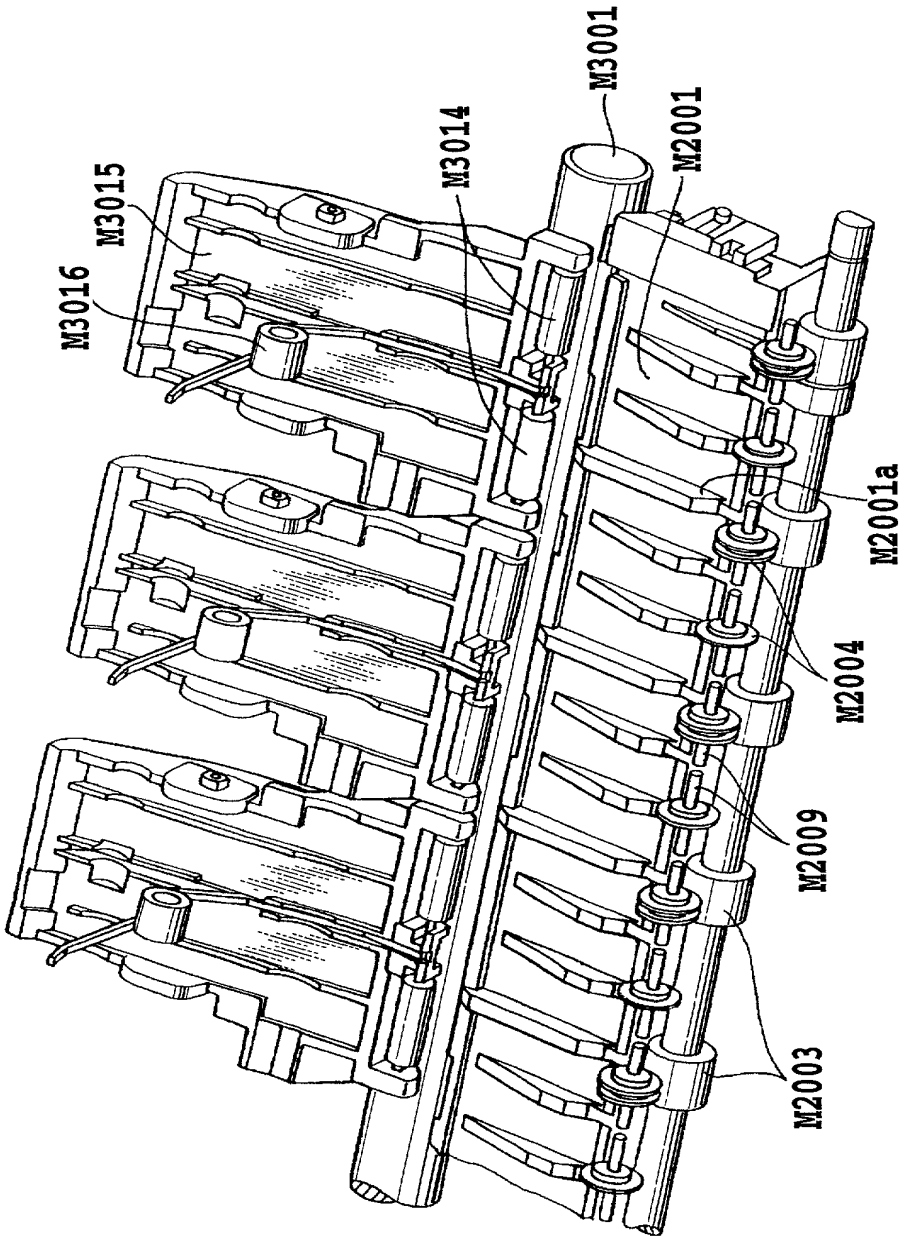


FIG.5

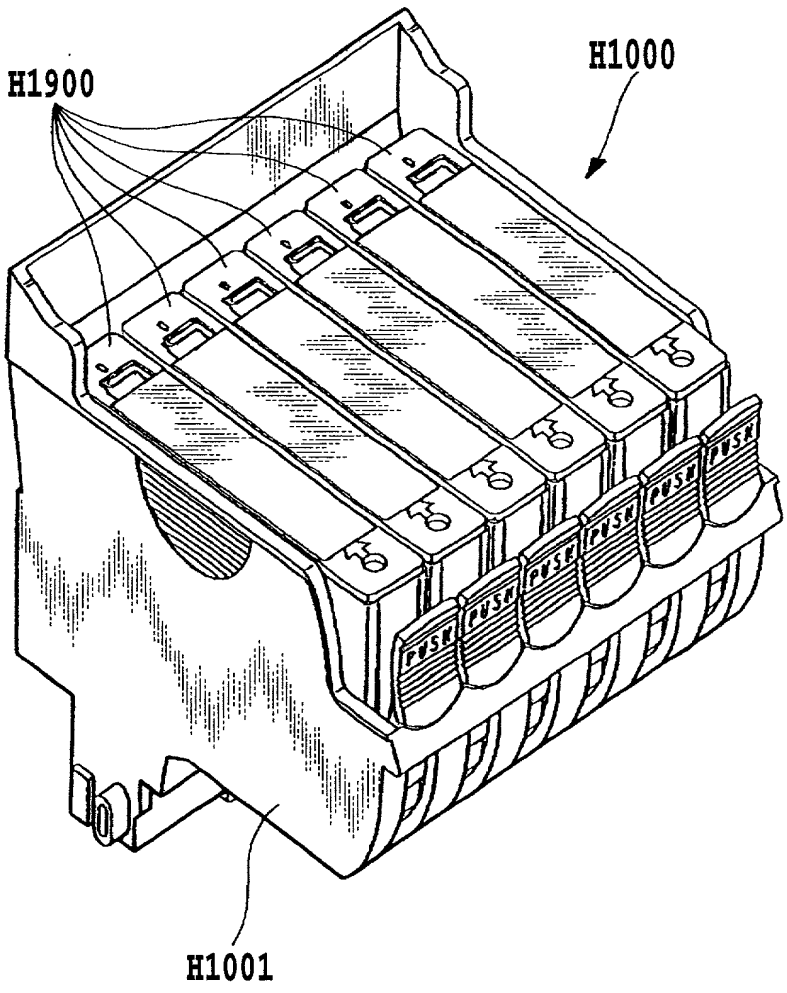


FIG.6

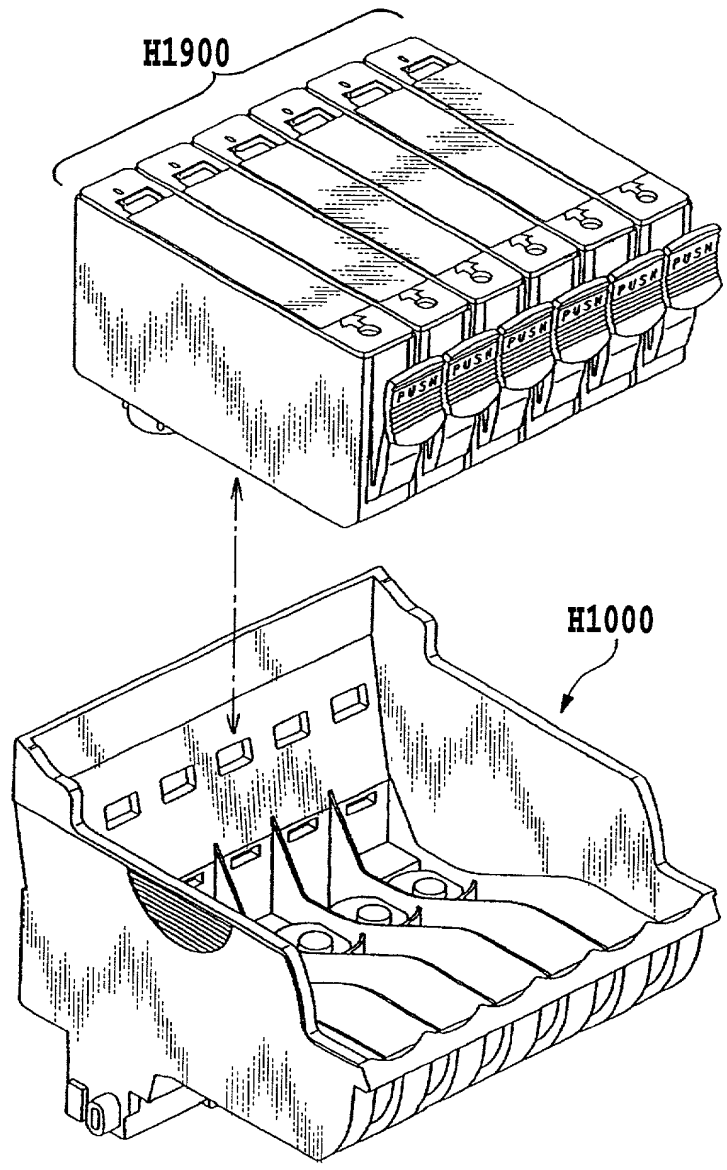


FIG.7

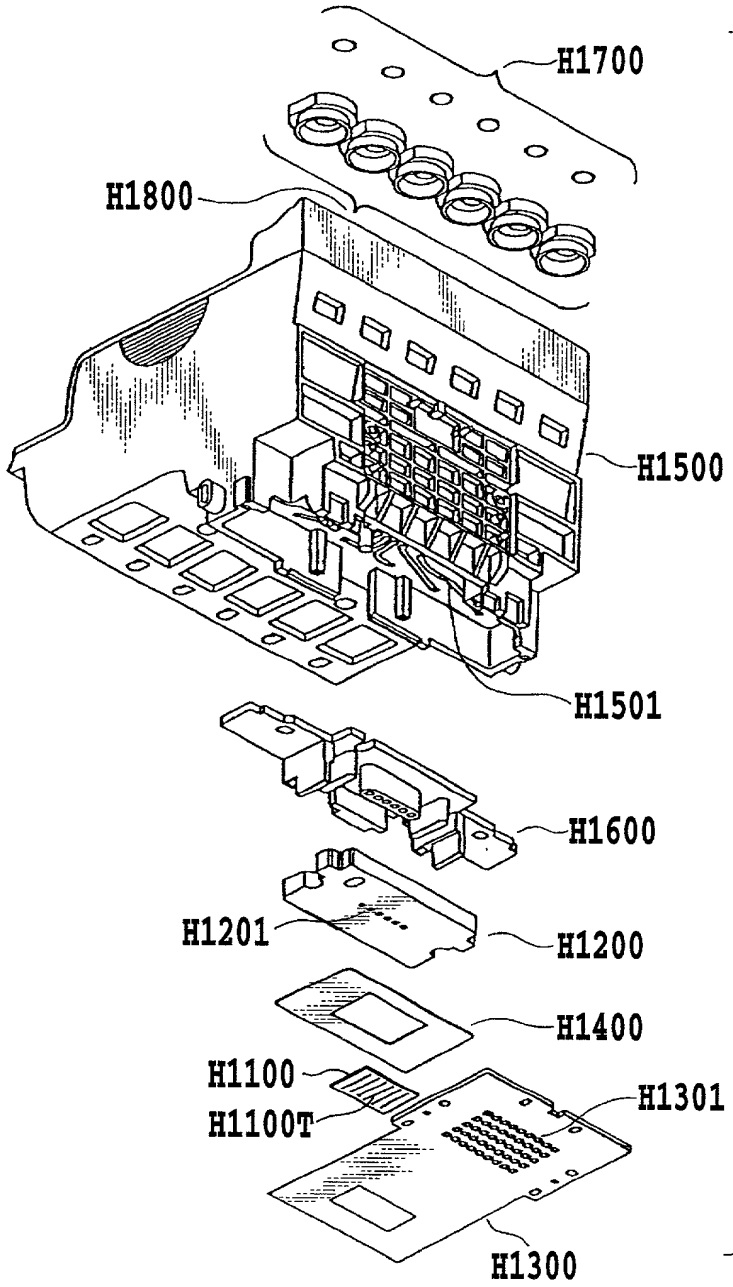

H1700
H1800
H1500
H1501
H1600
H1201
H1200
H1400
H1100
H1100T
H1301
H1300

FIG.8

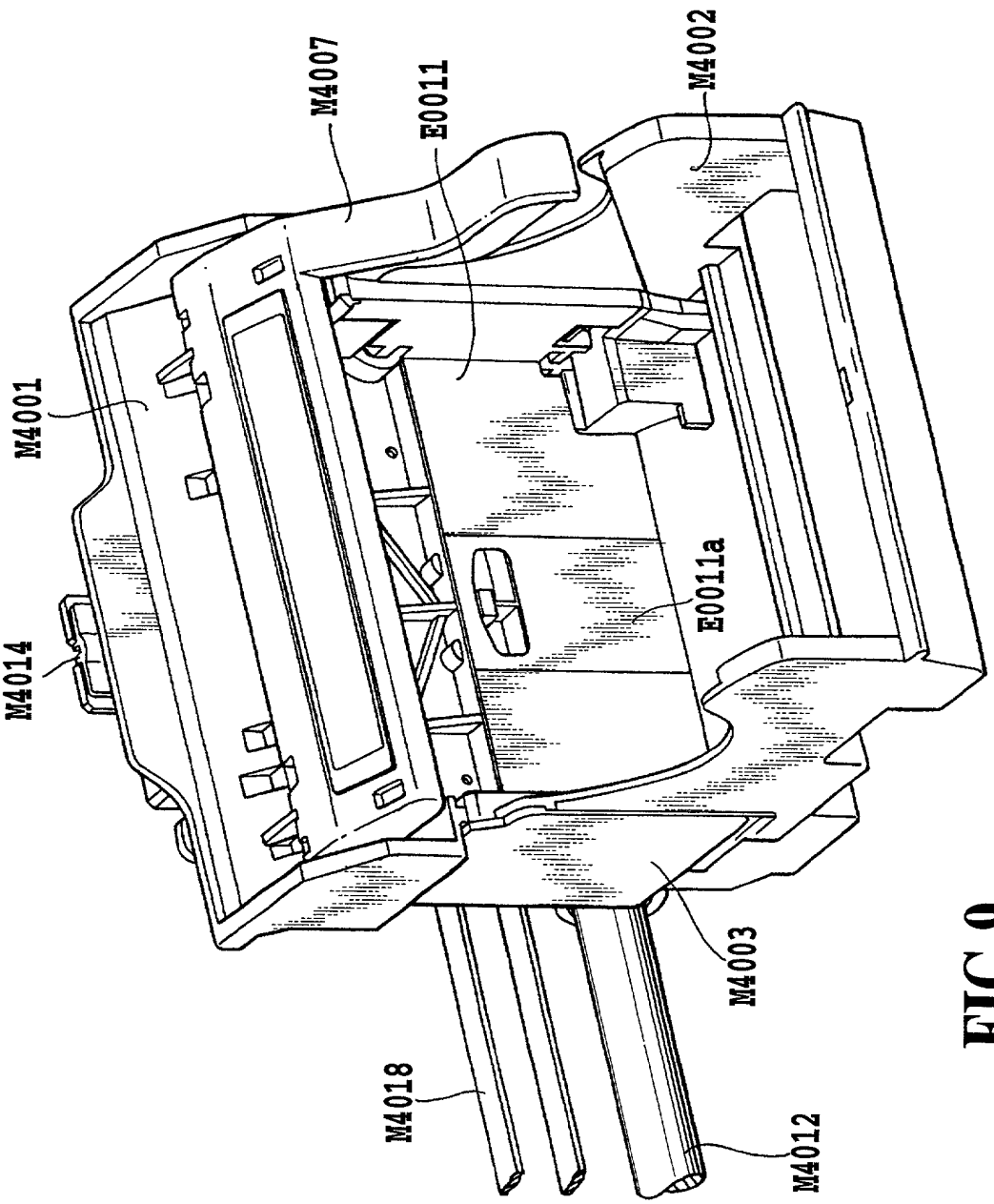


FIG.9

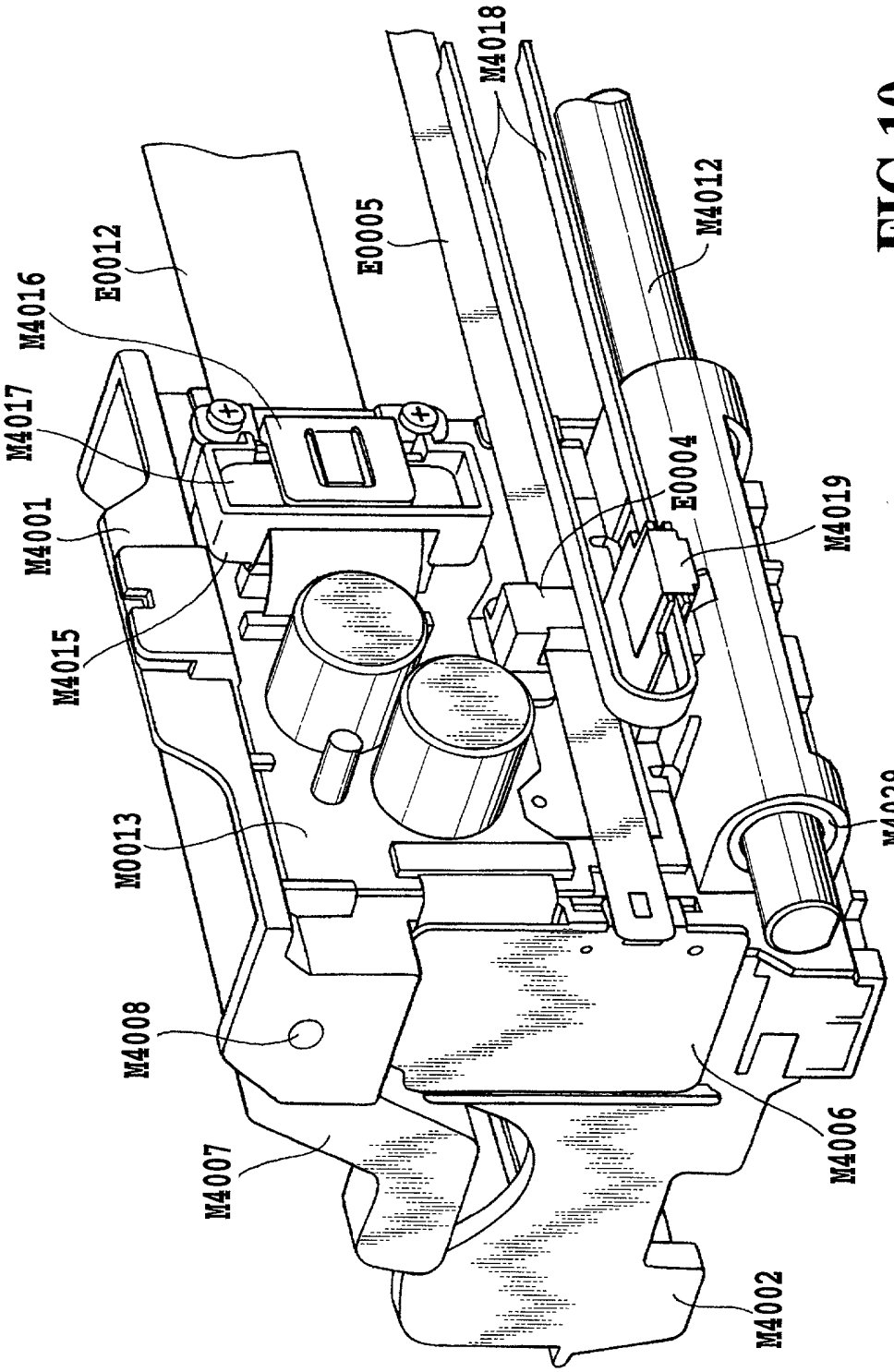

M4018
E0012
E0005
M4012
M4016
M4017
M4001
E0004
M4019
M4015
M0013
M4029
M4008
M4007
M4006
M4002

FIG.10

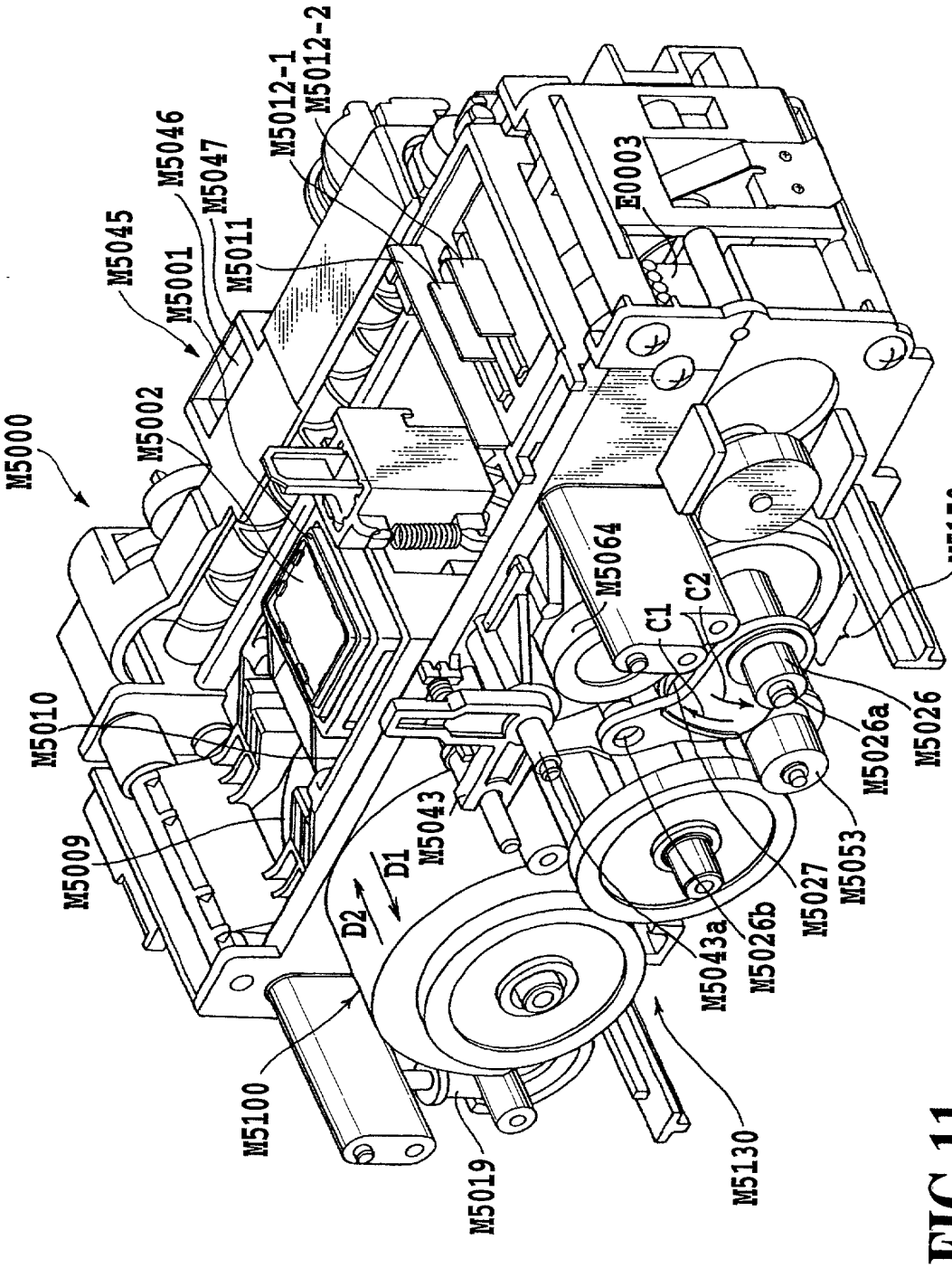

M5000
M5001
M5002
M5009
M5010
M5011
M5012-1
M5012-2
M5019
M5026
M5026a
M5026b
M5027
M5043
M5043a
M5045
M5046
M5047
M5053
M5064
M5100
M5130
M5150
E0003
C1
C2
D1
D2

FIG.11

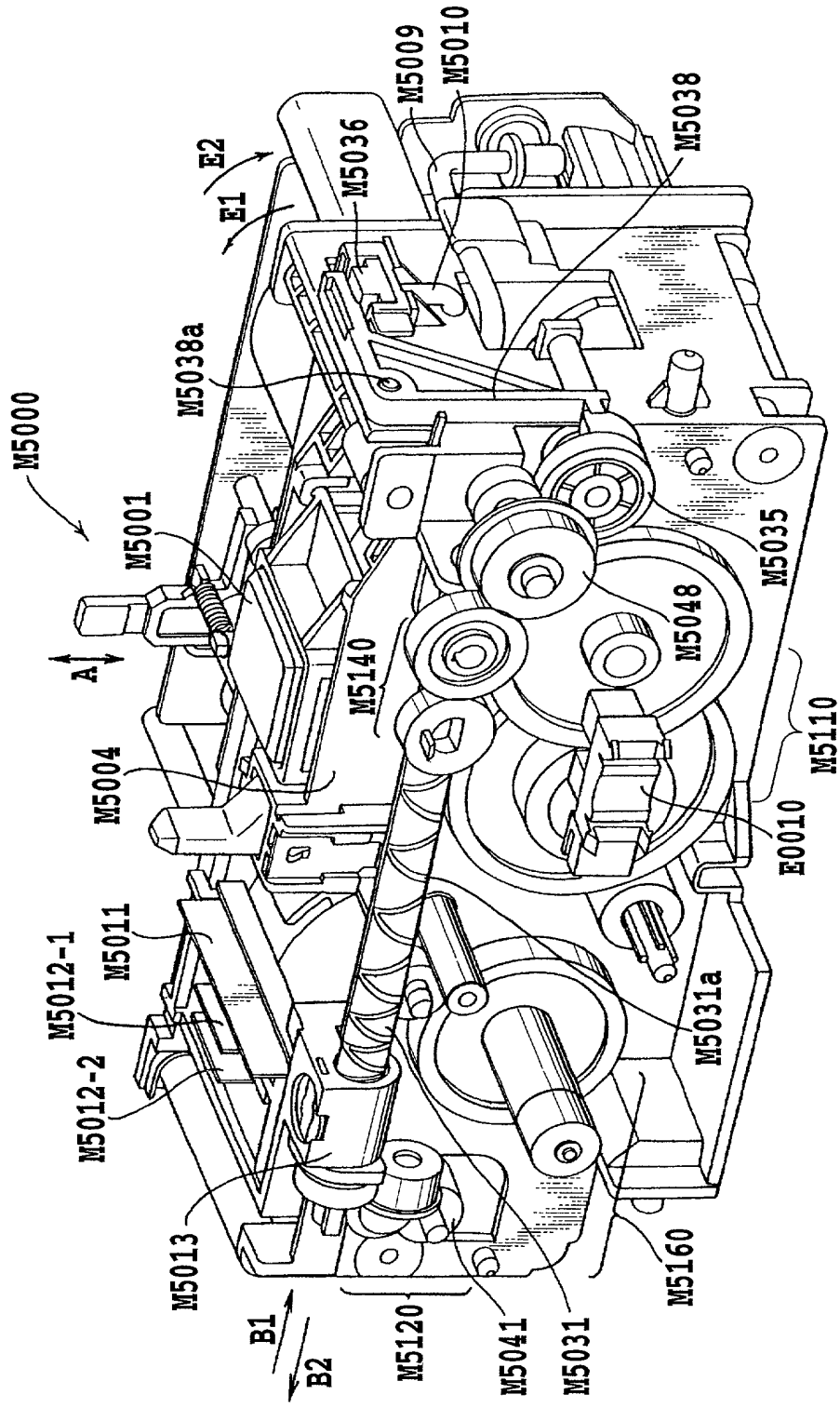

M5000
M5001
M5038a
M5036
M5009
M5010
M5038
E2
E1
A
M5004
M5140
M5048
M5035
M5110
E0010
M5011
M5012-1
M5012-2
M5031a
M5013
M5160
B1
B2
M5120
M5041
M5031

FIG.12

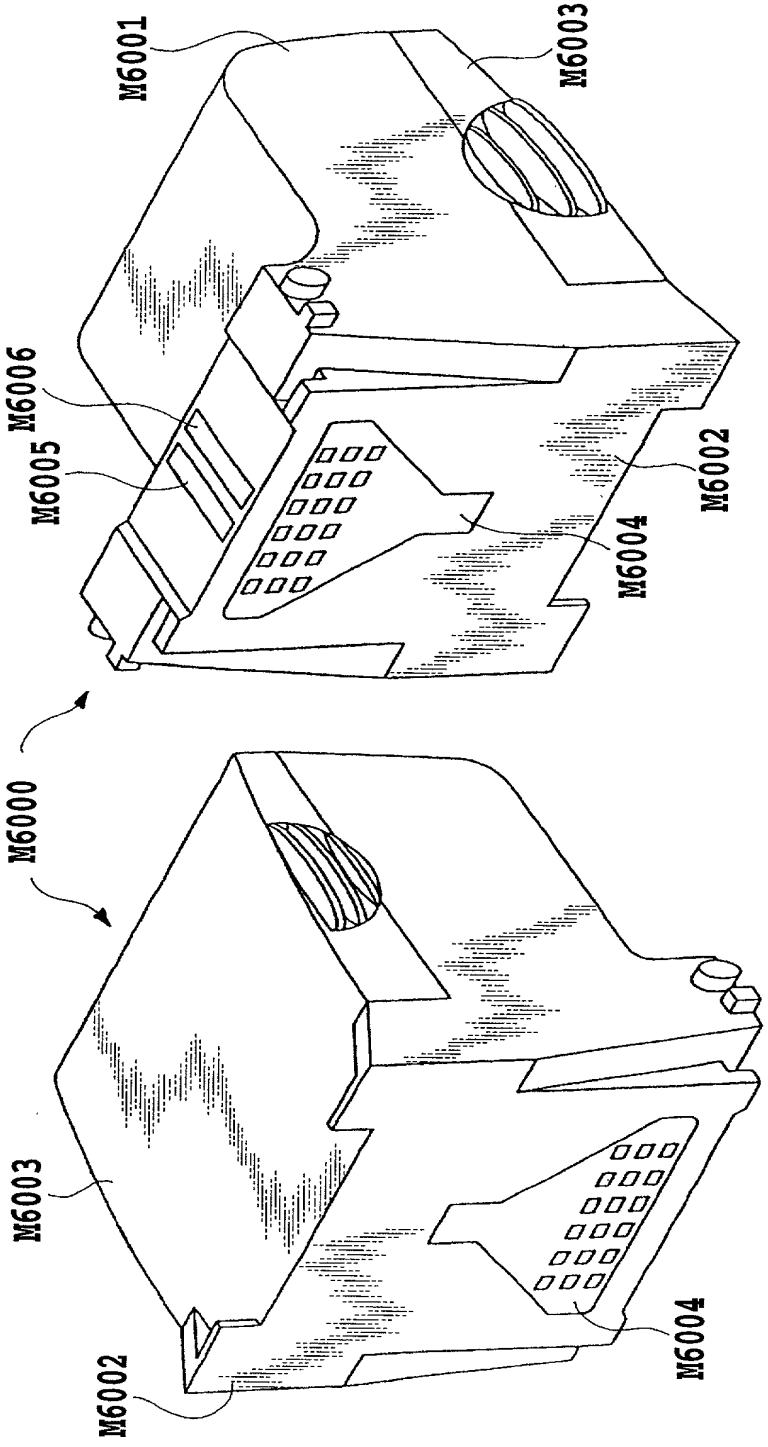


FIG.13B

FIG.13A

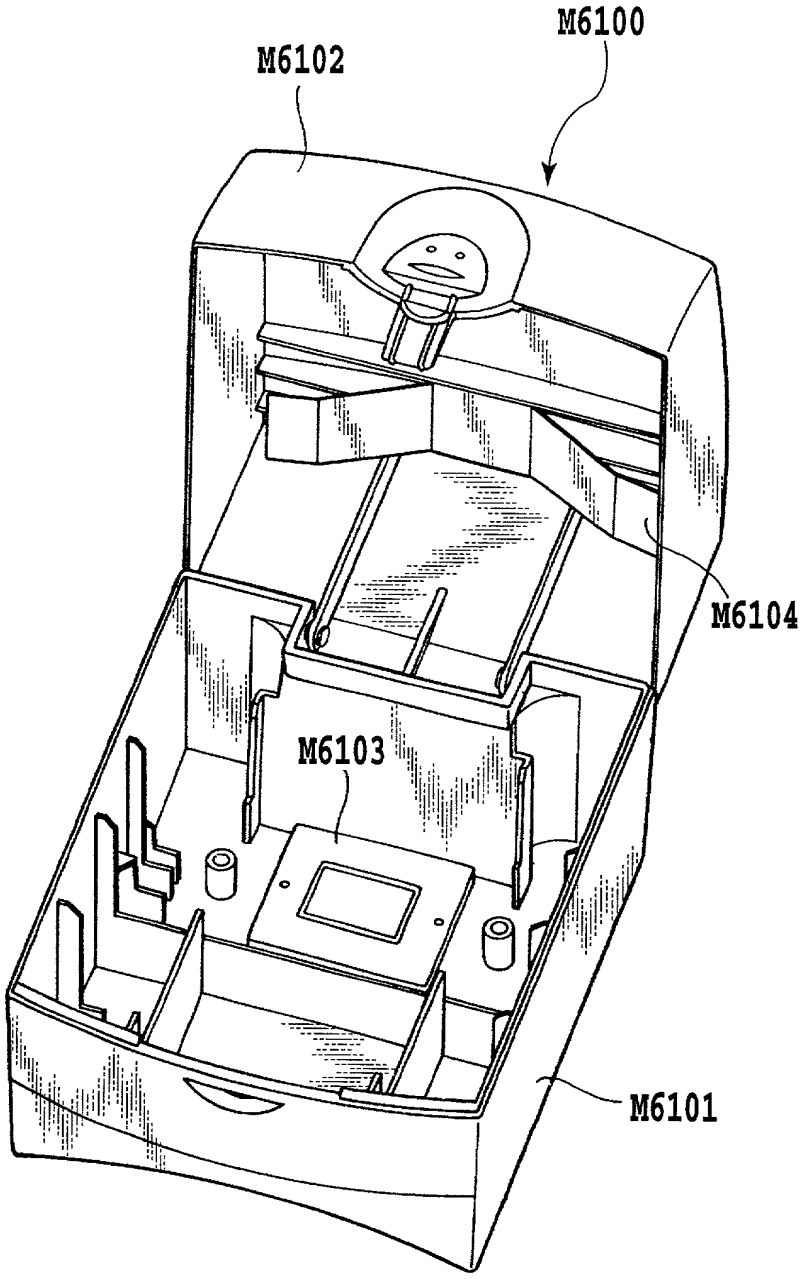


FIG.14

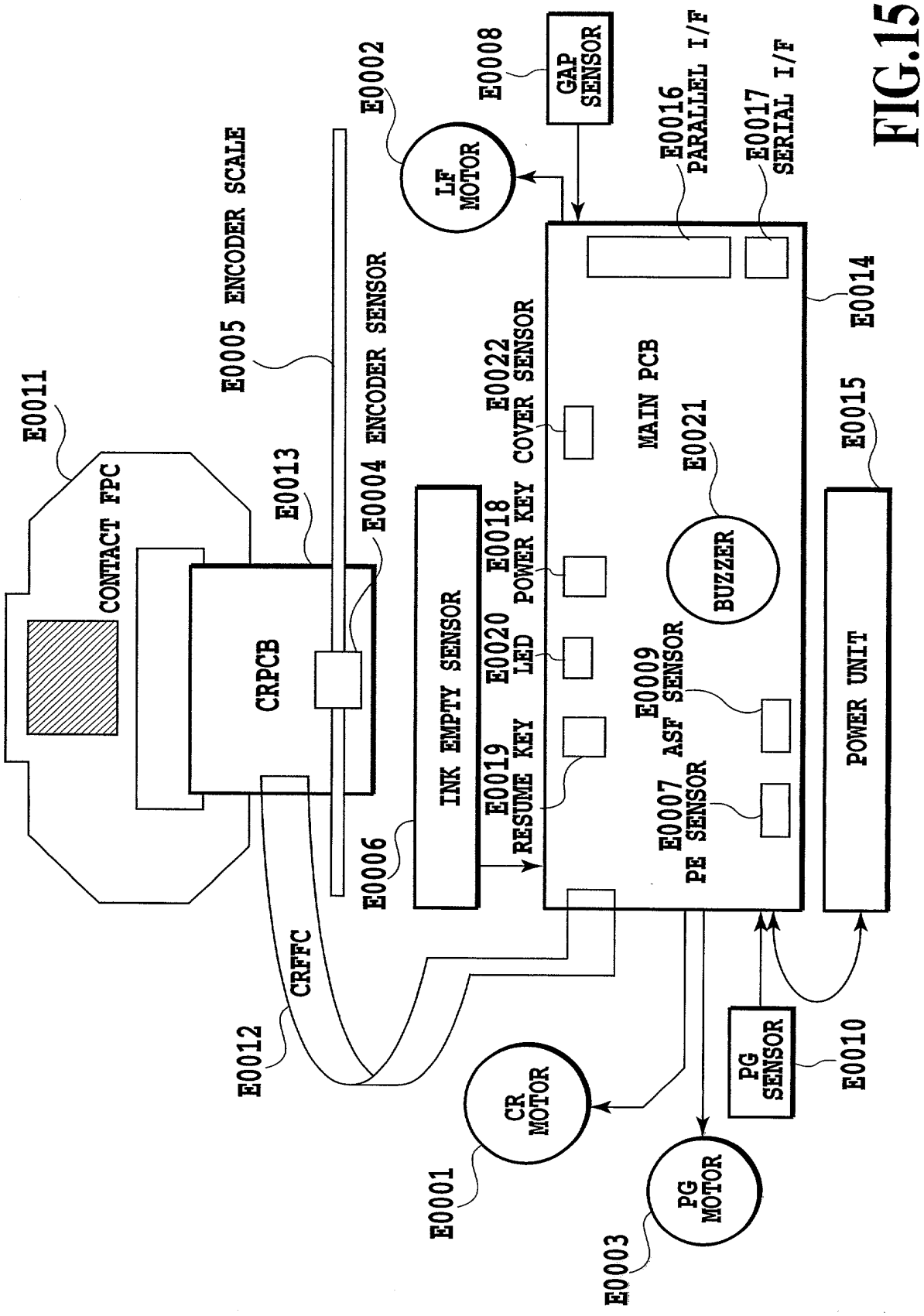

E0011
CONTACT FPC
E0013
CRPCB
E0005 ENCODER SCALE
E0004 ENCODER SENSOR
E0002
LF MOTOR
E0008
GAP SENSOR
E0016
PARALLEL I/F
E0017
SERIAL I/F
E0022
COVER SENSOR
MAIN PCB
E0014
E0021
BUZZER
E0015
POWER UNIT
E0018
POWER KEY
E0020
LED
E0009
ASF SENSOR
E0019
RESUME KEY
E0007
PE SENSOR
INK EMPTY SENSOR
E0006
E0012
CRFFC
CR MOTOR
E0001
PG MOTOR
E0003
PG SENSOR
E0010

FIG.15

FIG.16

FIG.16A	FIG.16B

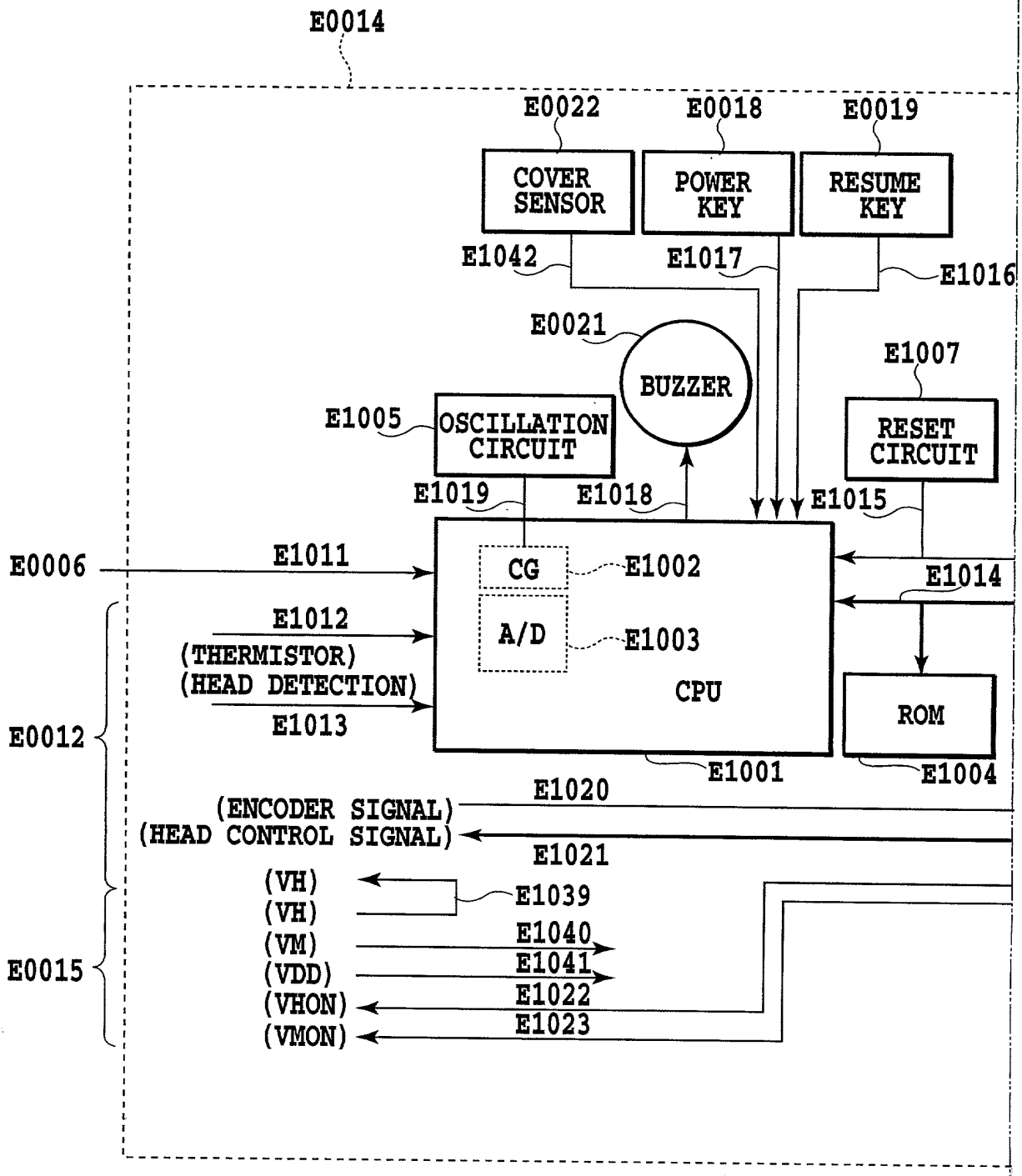


FIG.16A

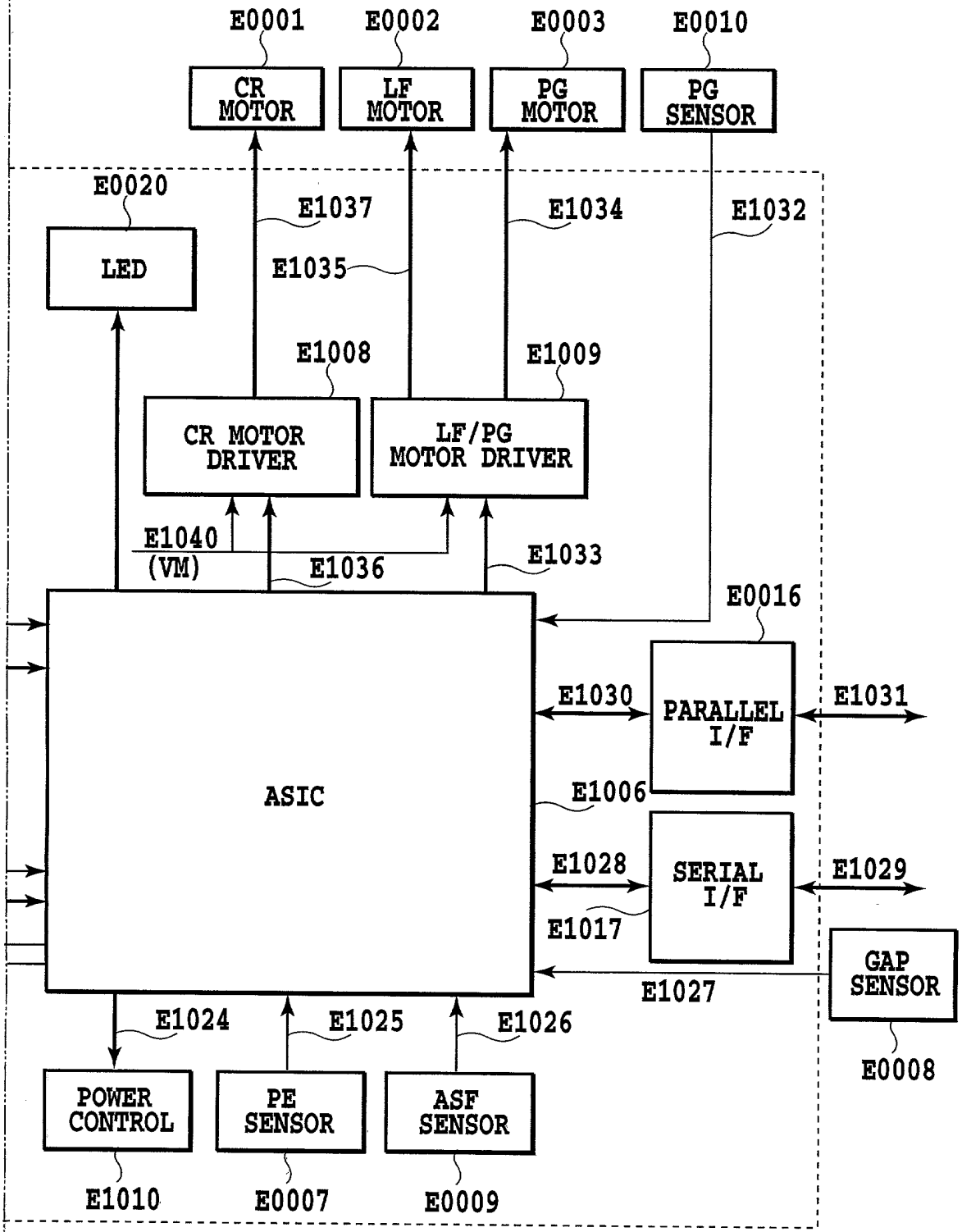

E0001
E0002
E0003
E0010
CR MOTOR
LF MOTOR
PG MOTOR
PG SENSOR
E0020
LED
E1037
E1035
E1034
E1032
E1008
E1009
CR MOTOR DRIVER
LF/PG MOTOR DRIVER
E1040
(VM)
E1036
E1033
E0016
ASIC
E1030
PARALLEL I/F
E1031
E1006
E1028
SERIAL I/F
E1029
E1017
GAP SENSOR
E1027
E0008
E1024
E1025
E1026
POWER CONTROL
PE SENSOR
ASF SENSOR
E1010
E0007
E0009

FIG.16B

FIG.17

FIG.17A FIG.17B

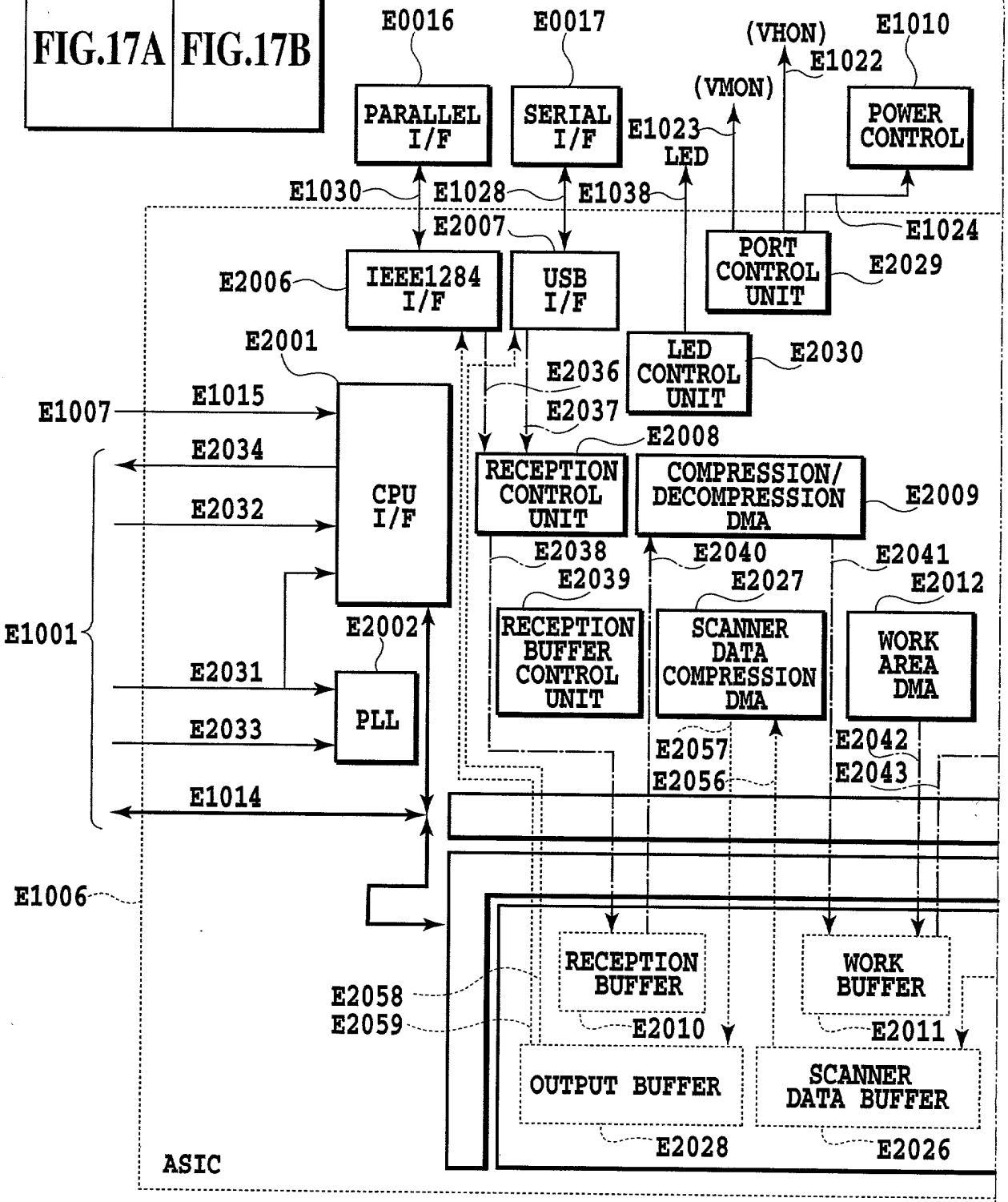


FIG.17A

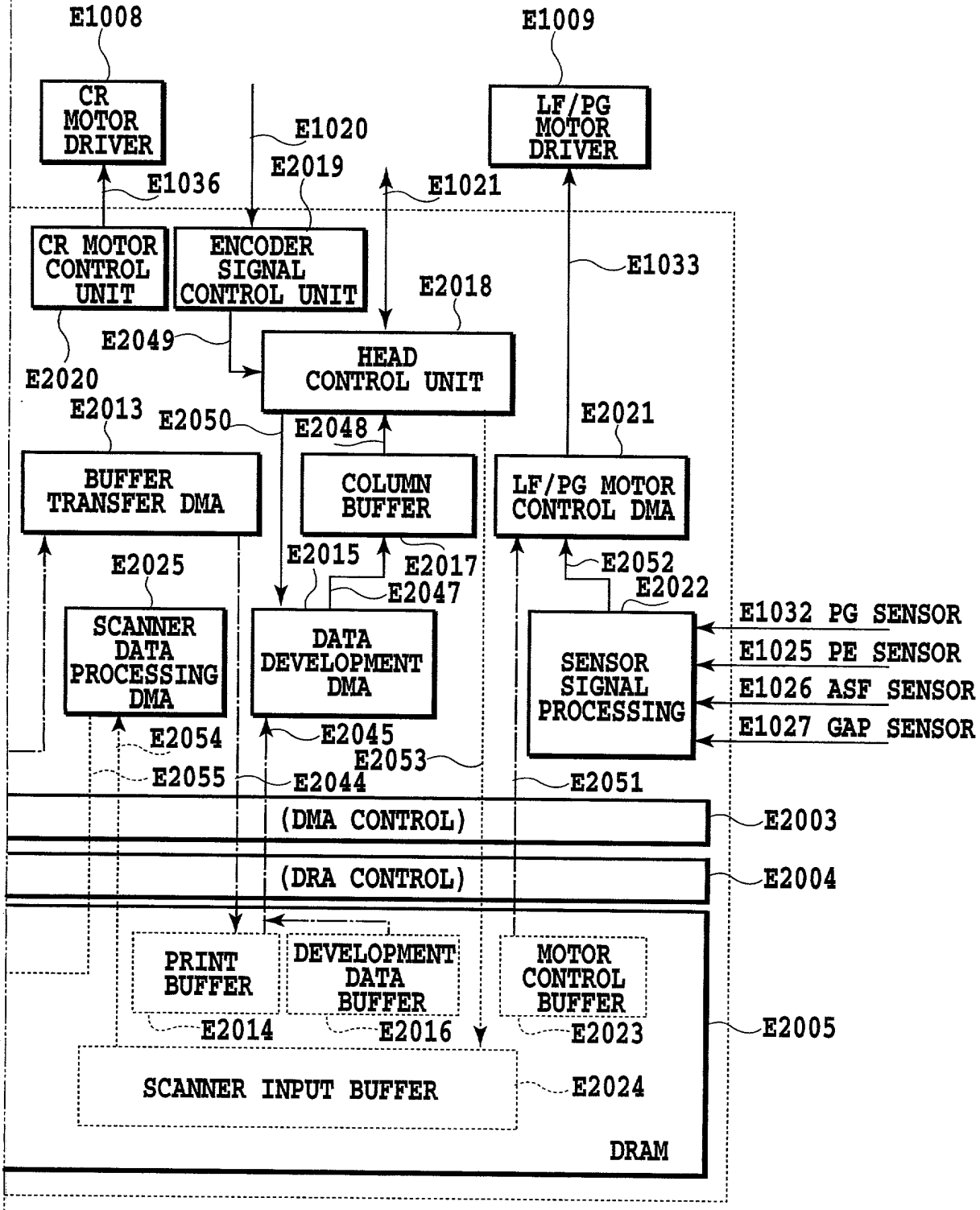

E1008
CR MOTOR DRIVER
E1009
LF/PG MOTOR DRIVER
E1020
E2019
E1036
E1021
CR MOTOR CONTROL UNIT
ENCODER SIGNAL CONTROL UNIT
E1033
E2018
E2049
HEAD CONTROL UNIT
E2020
E2013
E2050
E2048
E2021
BUFFER TRANSFER DMA
COLUMN BUFFER
LF/PG MOTOR CONTROL DMA
E2025
E2015
E2017
E2052
E2047
E2022
E1032 PG SENSOR
E1025 PE SENSOR
E1026 ASF SENSOR
E1027 GAP SENSOR
SCANNER DATA PROCESSING DMA
DATA DEVELOPMENT DMA
SENSOR SIGNAL PROCESSING
E2054
E2045
E2053
E2055
E2044
E2051
(DMA CONTROL)
E2003
(DRA CONTROL)
E2004
PRINT BUFFER
DEVELOPMENT DATA BUFFER
MOTOR CONTROL BUFFER
E2005
E2014
E2016
E2023
SCANNER INPUT BUFFER
E2024
DRAM

FIG.17B

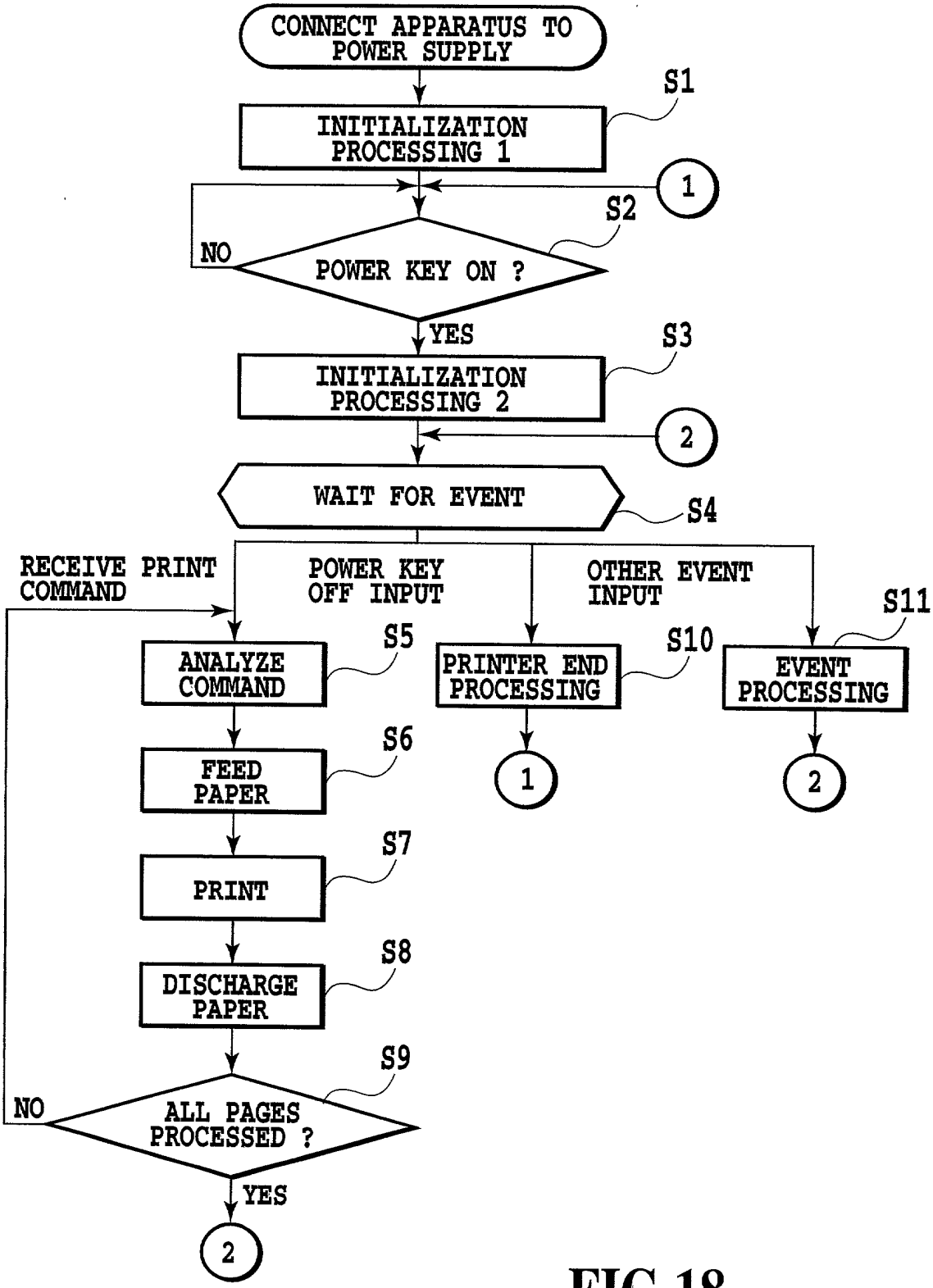

CONNECT APPARATUS TO POWER SUPPLY
S1
INITIALIZATION PROCESSING 1
1
S2
NO
POWER KEY ON ?
YES
S3
INITIALIZATION PROCESSING 2
2
WAIT FOR EVENT
S4
RECEIVE PRINT COMMAND
POWER KEY OFF INPUT
OTHER EVENT INPUT
S11
S5
ANALYZE COMMAND
S10
PRINTER END PROCESSING
EVENT PROCESSING
S6
FEED PAPER
1
2
S7
PRINT
S8
DISCHARGE PAPER
S9
NO
ALL PAGES PROCESSED ?
YES
2

FIG.18

PATCH PRINTED ON AREA OF SHEET WHICH IS ENSURED THAT SHEET IS FED ACCURATELY (FIRST AREA)

FIG.19A

PATCH PRINTED ON AREA OF SHEET WHICH IS NOT ENSURED THAT SHEET IS FED ACCURATELY (SECOND AREA)

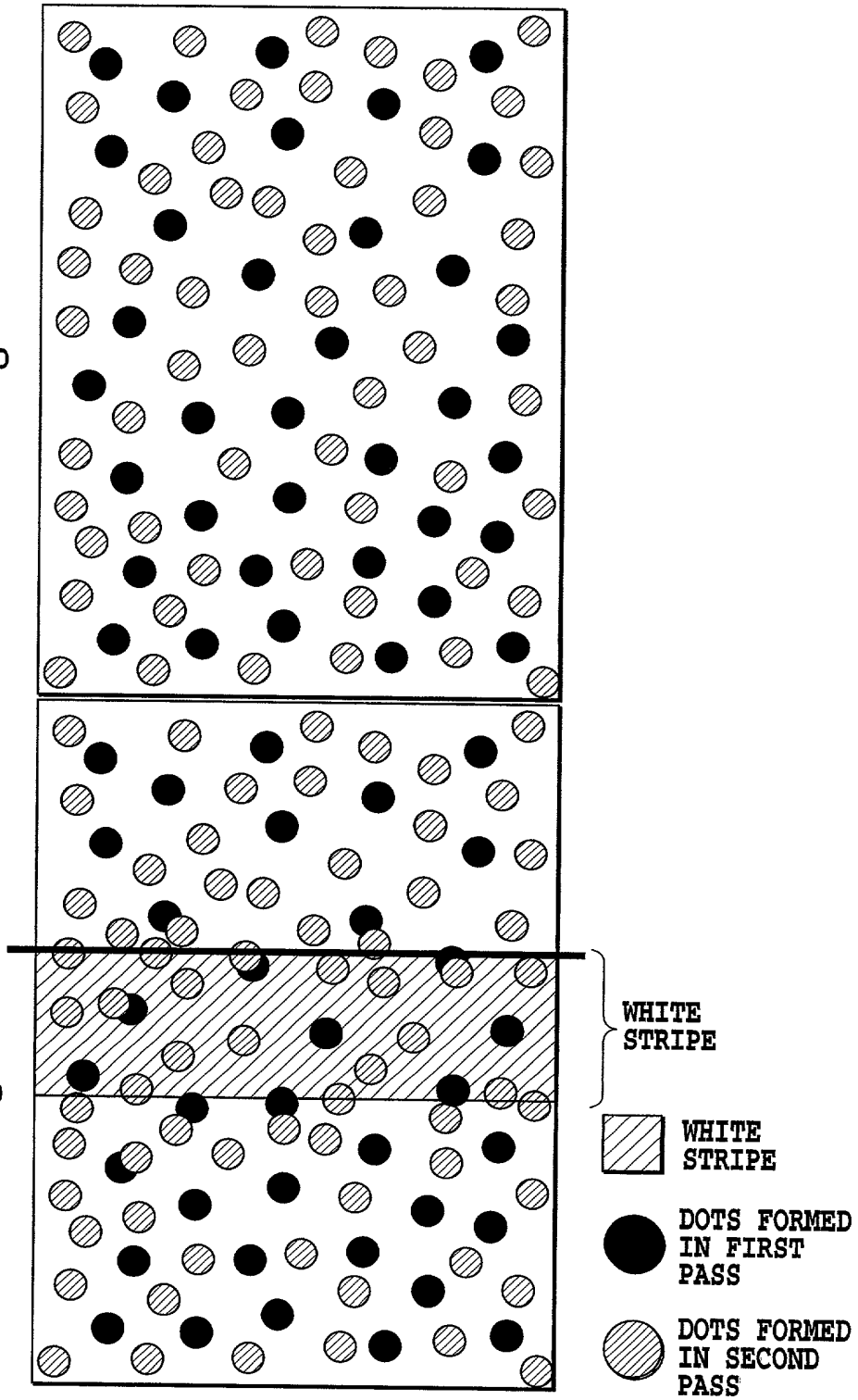


FIG.19B

1690250 "09250 091

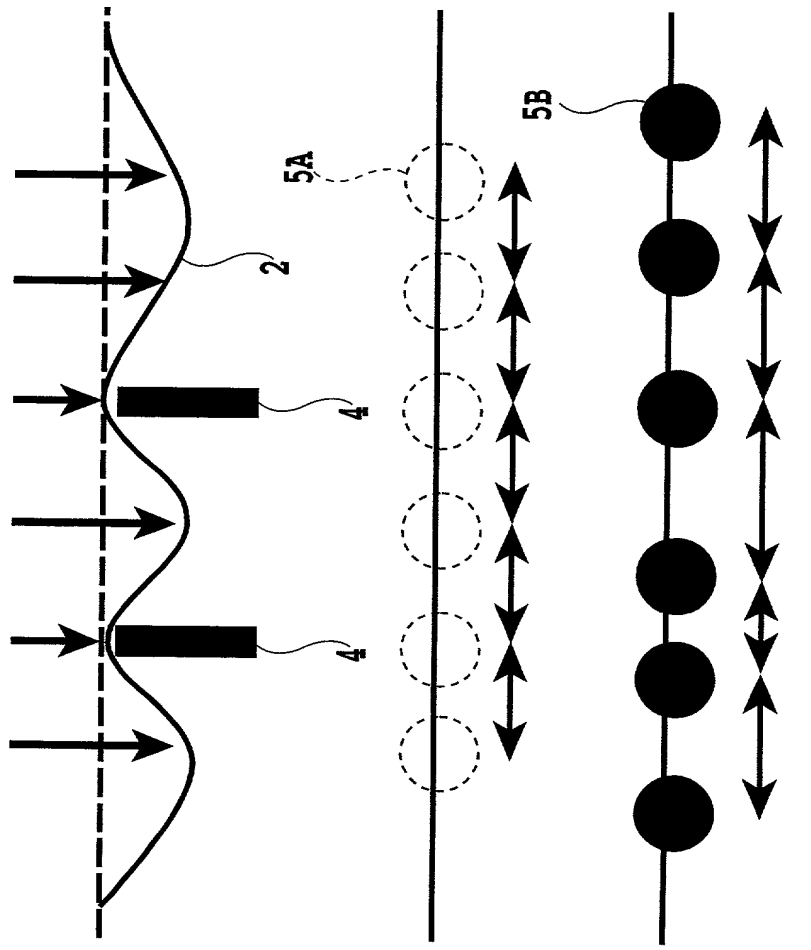

2
4
4
5A
5B
DOT LANDING LOCATIONS ;IDEAL
DOT LANDING LOCATIONS ;ACTUAL

FIG.20

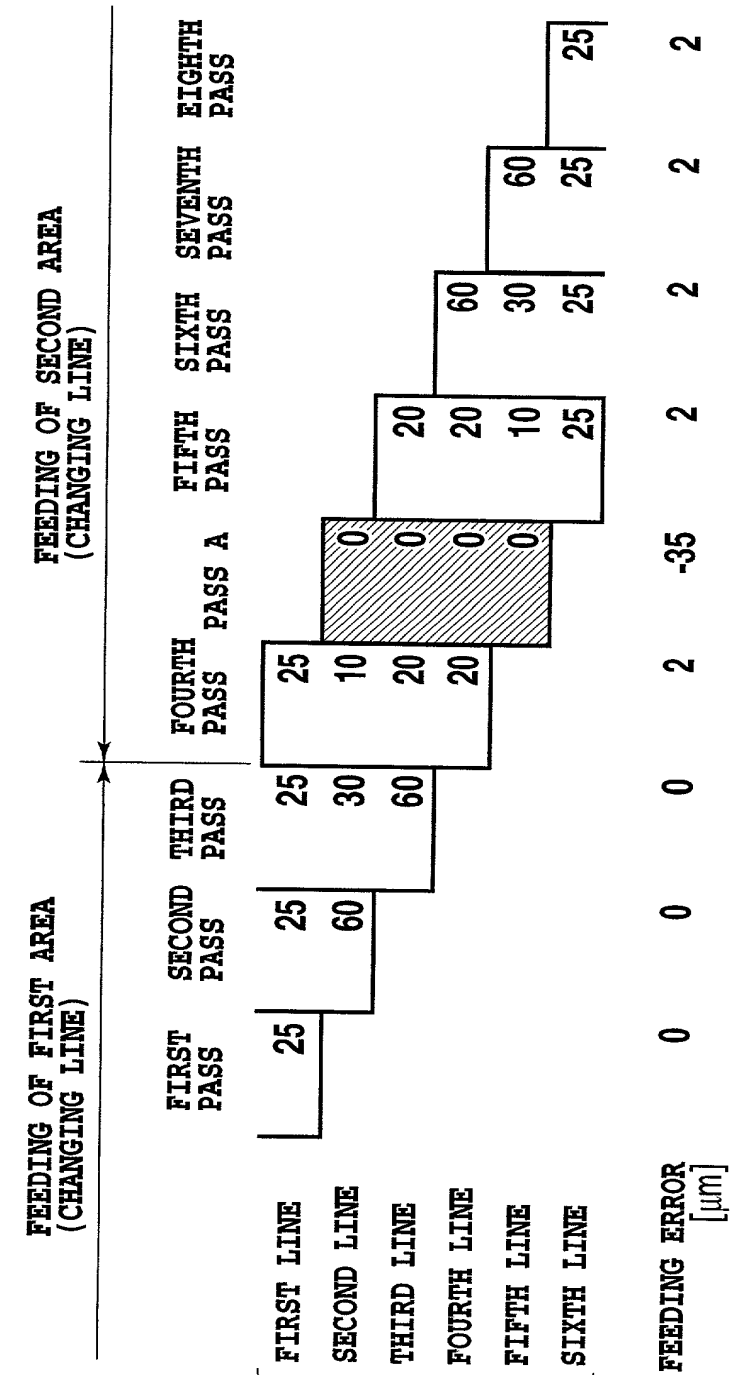

FEEDING OF FIRST AREA (CHANGING LINE)
FEEDING OF SECOND AREA (CHANGING LINE)
FIRST PASS
SECOND PASS
THIRD PASS
FOURTH PASS
PASS A
FIFTH PASS
SIXTH PASS
SEVENTH PASS
EIGHTH PASS
TOTAL DUTY
PRINTING ON SECOND AREA
FIRST LINE 25 25 25 0 25 100
SECOND LINE 60 30 10 0 20 60 100
THIRD LINE 60 20 0 20 20 60 100
FOURTH LINE 20 0 20 20 60 100
FIFTH LINE 0 10 30 60 100
SIXTH LINE 25 25 25 100
FEEDING ERROR [μm] 0 0 0 2 -35 2 2 2 2

FIG.21

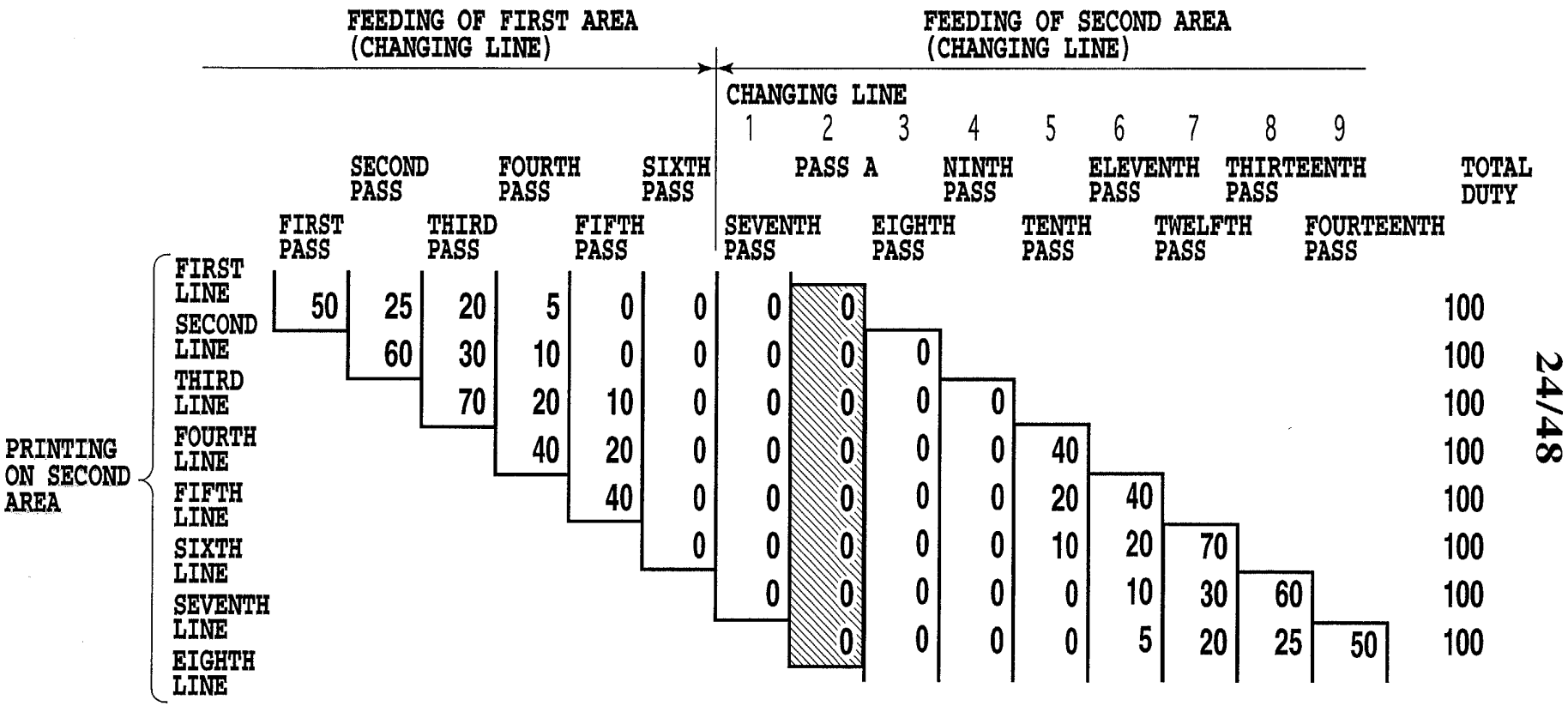

FEEDING OF FIRST AREA (CHANGING LINE)
FEEDING OF SECOND AREA (CHANGING LINE)
CHANGING LINE
1 2 3 4 5 6 7 8 9
FIRST PASS
SECOND PASS
THIRD PASS
FOURTH PASS
FIFTH PASS
SIXTH PASS
SEVENTH PASS
PASS A
EIGHTH PASS
NINTH PASS
TENTH PASS
ELEVENTH PASS
TWELFTH PASS
THIRTEENTH PASS
FOURTEENTH PASS
TOTAL DUTY
PRINTING ON SECOND AREA
FIRST LINE 50 25 20 5 0 0 0 0 100
SECOND LINE 60 30 10 0 0 0 0 0 100
THIRD LINE 70 20 10 0 0 0 0 0 0 100
FOURTH LINE 40 20 0 0 0 0 0 40 100
FIFTH LINE 40 0 0 0 0 0 20 40 100
SIXTH LINE 0 0 0 0 0 10 20 70 100
SEVENTH LINE 0 0 0 0 0 0 10 30 60 100
EIGHTH LINE 0 0 0 0 0 5 20 25 50 100

FIG.22

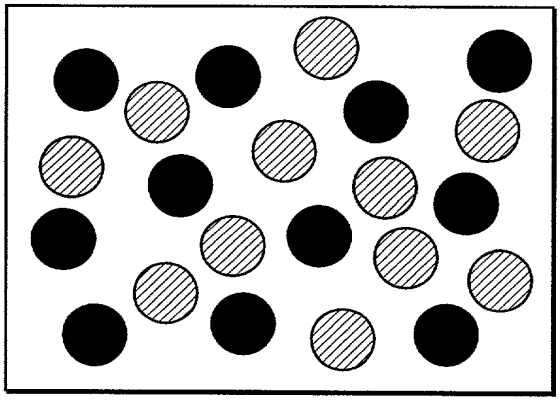
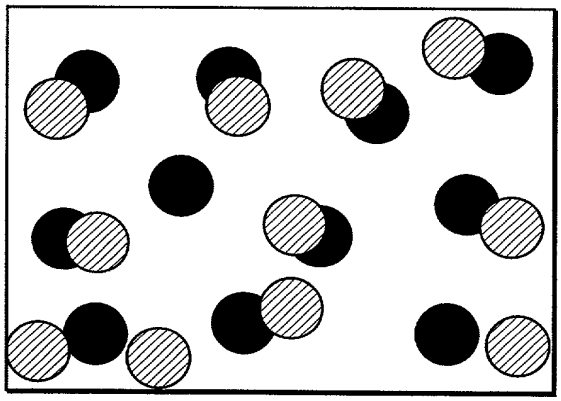


FIG.23A

DOT FORMATION WITHOUT
DEVIATION OF DOTS



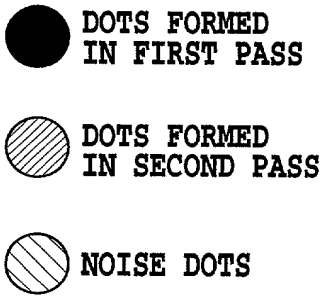


FIG.23B

DOT FORMATION WITH
DEVIATION OF DOTS
CAUSED BY FEEDING ERROR

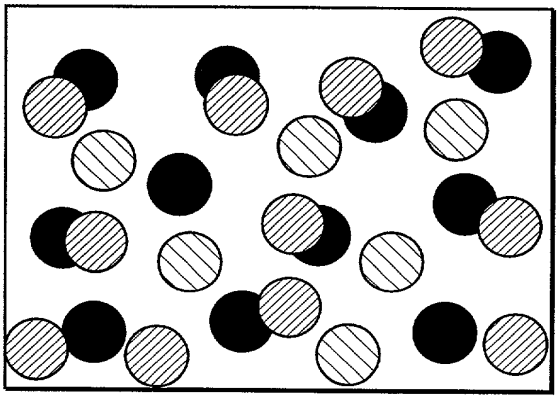


FIG.23C

DOT FORMATION OBTAINED
BY ADDING NOISE DOTS
TO THAT OF FIG.23B

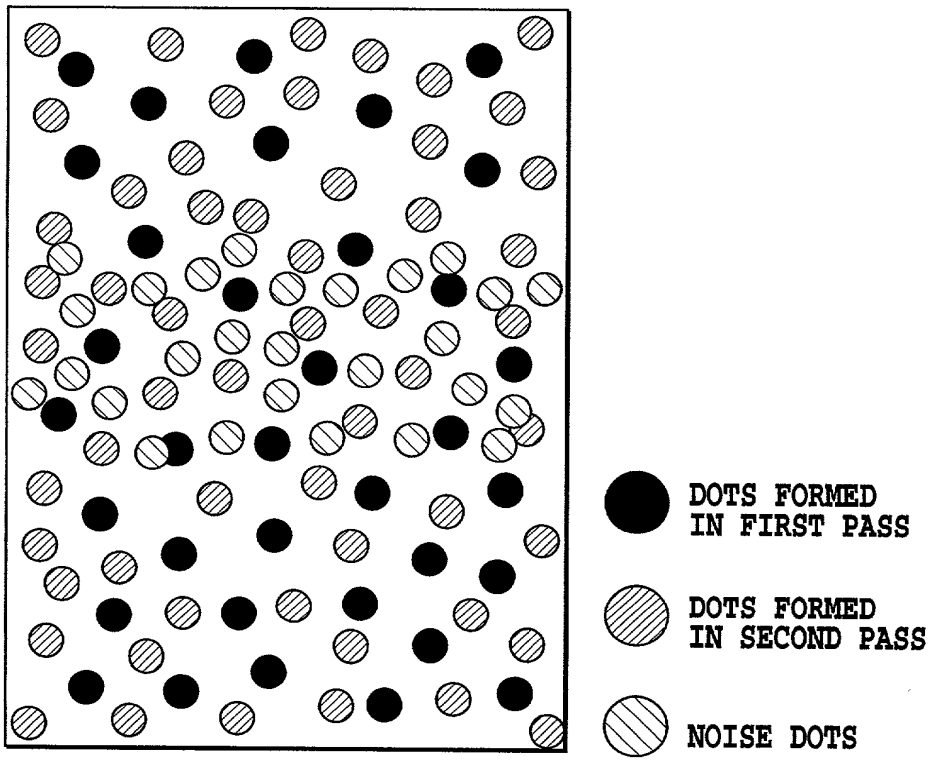

DOTS FORMED IN FIRST PASS
DOTS FORMED IN SECOND PASS
NOISE DOTS

FIG.24

FIRST NEW LINE ;NOISE: 0%
SECOND NEW LINE ;NOISE: 1%
THIRD NEW LINE ;NOISE: 3%
FOURTH NEW LINE ;NOISE: 5%
FIFTH NEW LINE ;NOISE: 3%
SIXTH NEW LINE ;NOISE: 1%
SEVENTH NEW LINE ;NOISE: 0%

FIG.25

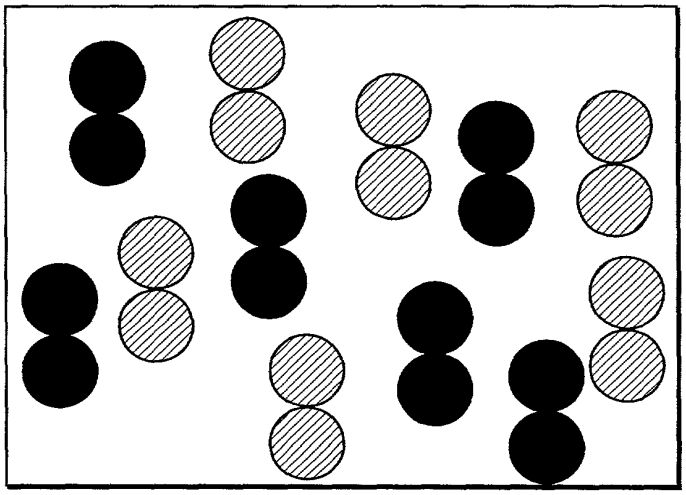


FIG.26A

DOT FORMATION WITHOUT FEEDING ERROR

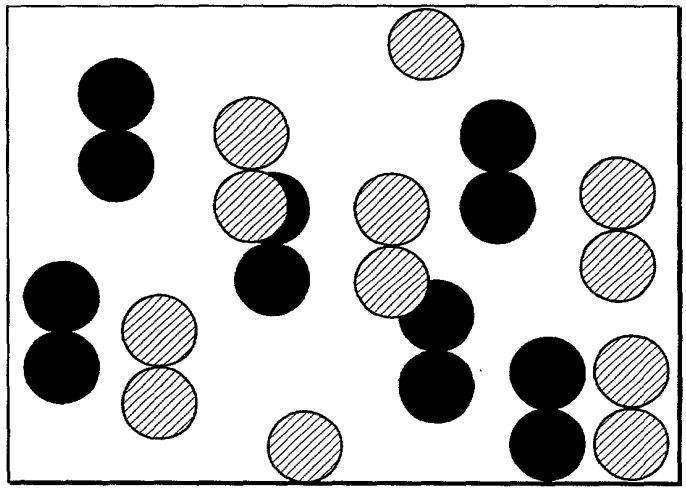
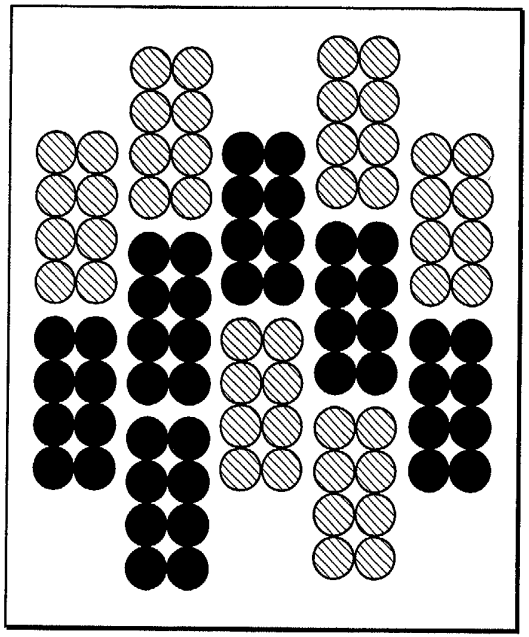


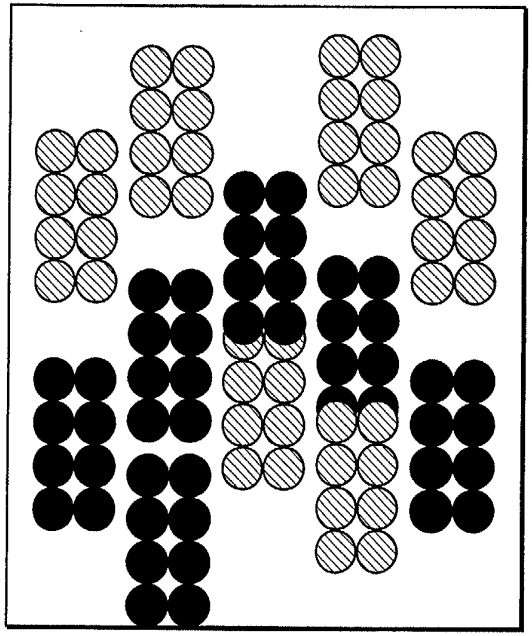
FIG.26B

DOT FORMATION WITH FEEDING ERROR



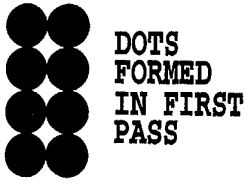
DOT FORMATION WITHOUT FEEDING ERROR

FIG.27A

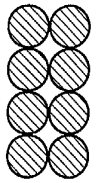


DOT FORMATION WITH FEEDING ERROR

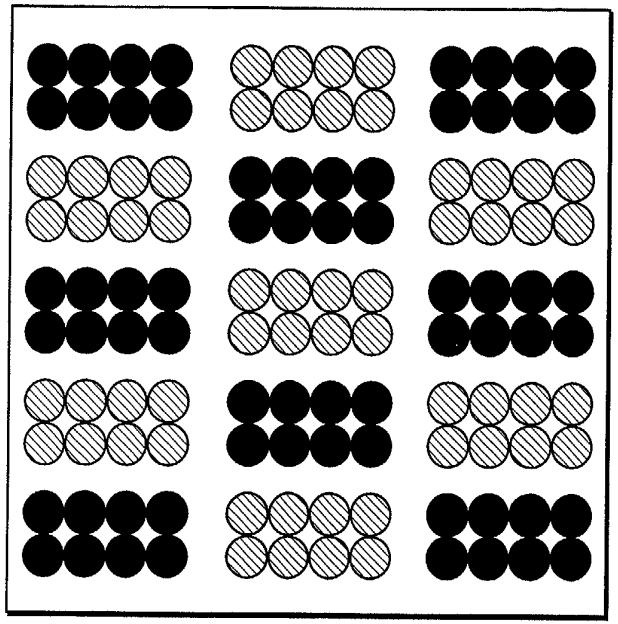
FIG.27B



DOTS FORMED IN FIRST PASS

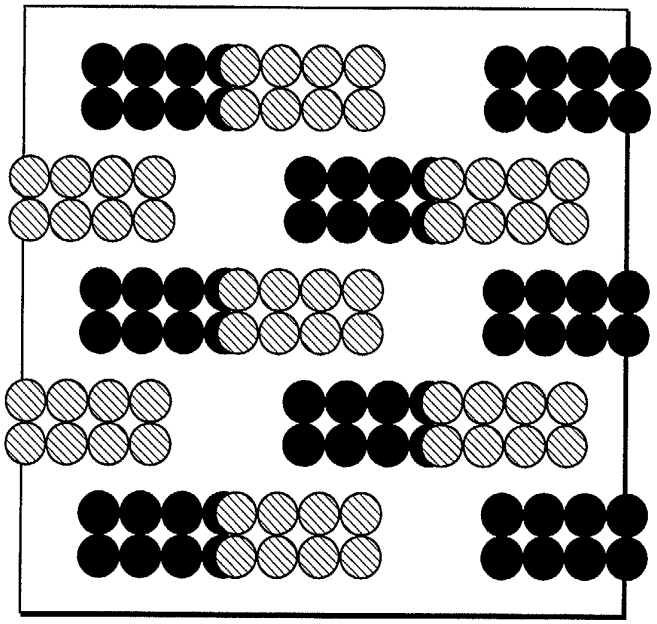


DOTS FORMED IN SECOND PASS



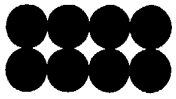
DOT FORMATION WITHOUT ERROR
IN MAIN-SCANNING DIRECTION

FIG.28A

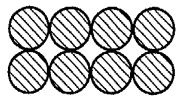


DOT FORMATION WITH ERROR
IN MAIN-SCANNING DIRECTION

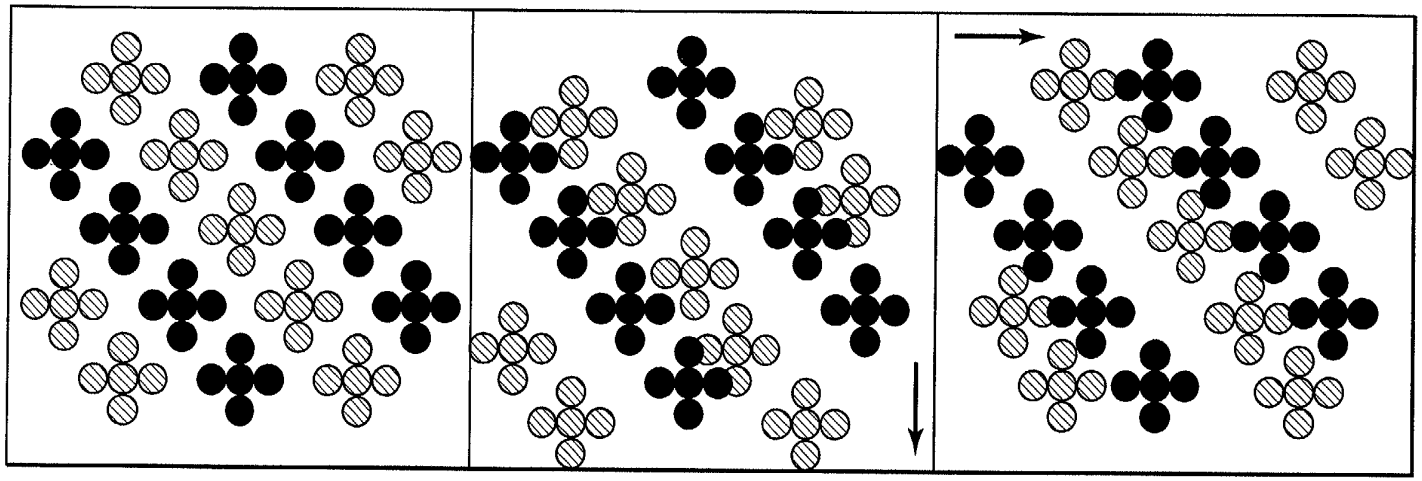
FIG.28B



DOTS FORMED IN FIRST PASS



DOTS FORMED IN SECOND PASS



DOT FORMATION WITHOUT FEEDING ERROR

FIG.29A

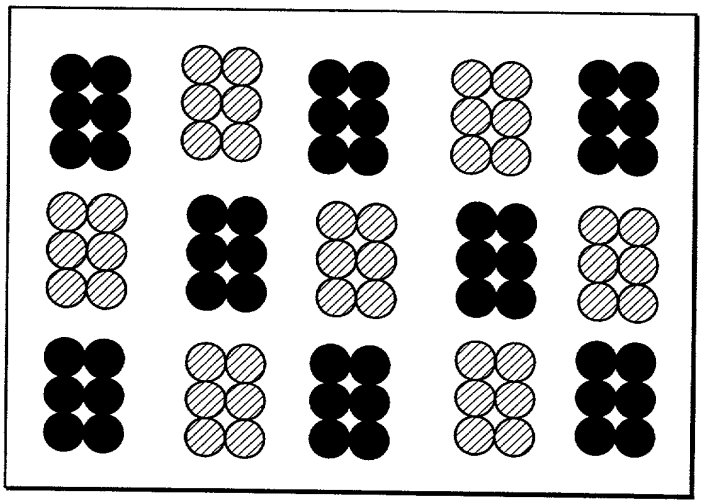
DOT FORMATION WITH ERROR IN SUB-SCANNING DIRECTION

FIG.29B

DOT FORMATION WITH ERROR IN MAIN-SCANNING DIRECTION

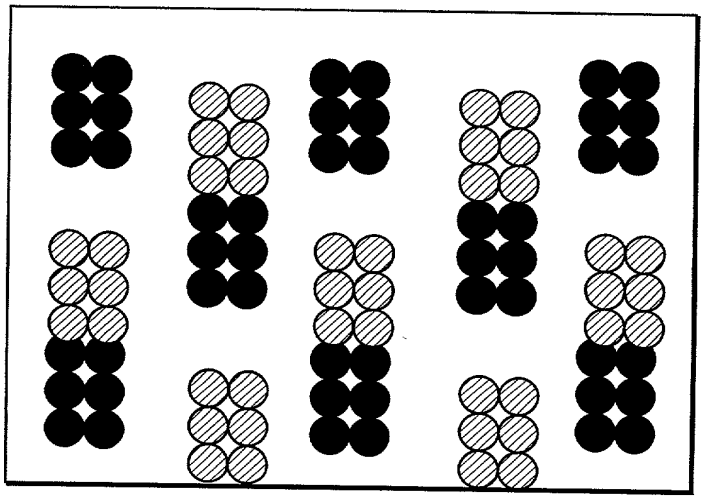
FIG.29C

FIG.30A



DOT FORMATION WITHOUT FEEDING ERROR

FIG.30B



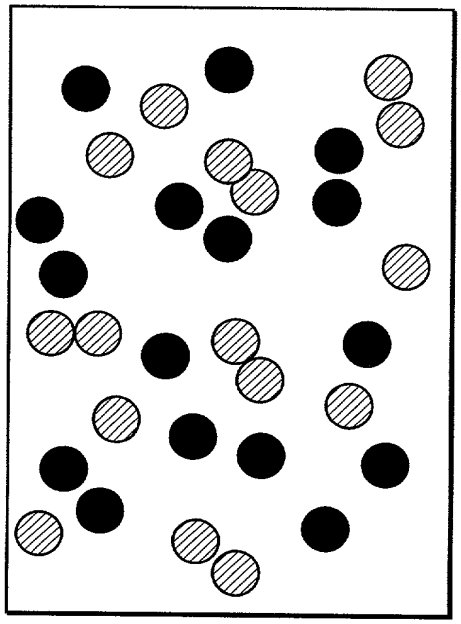
DOT FORMATION WITH FEEDING ERROR

DOTS FORMED IN FIRST PASS

DOTS FORMED IN SECOND PASS

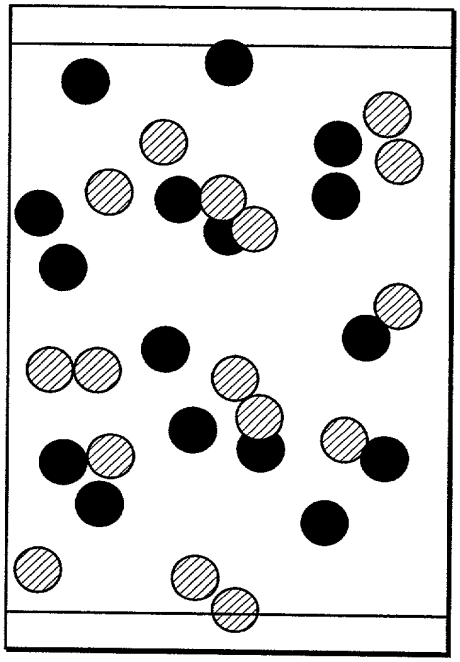
09/890,054 08/27/01

RANDOM DOT FORMATION
(CONTAINING LOW FREQUENCY COMPONENTS)



DOT FORMATION
WITHOUT FEEDING ERROR

FIG.31A



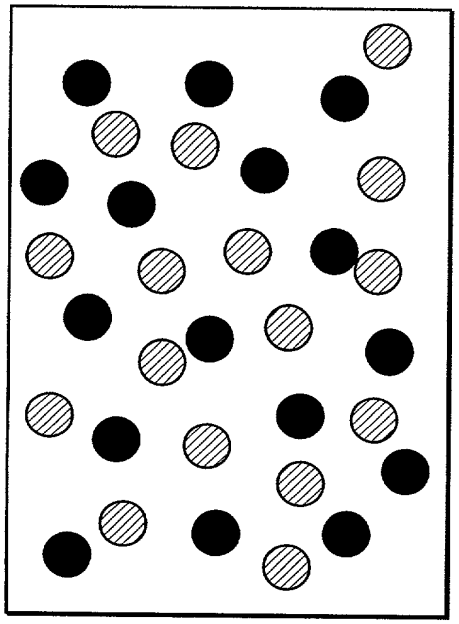
DOT FORMATION
WITH FEEDING ERROR

FIG.31B

DOTS FORMED IN FIRST PASS

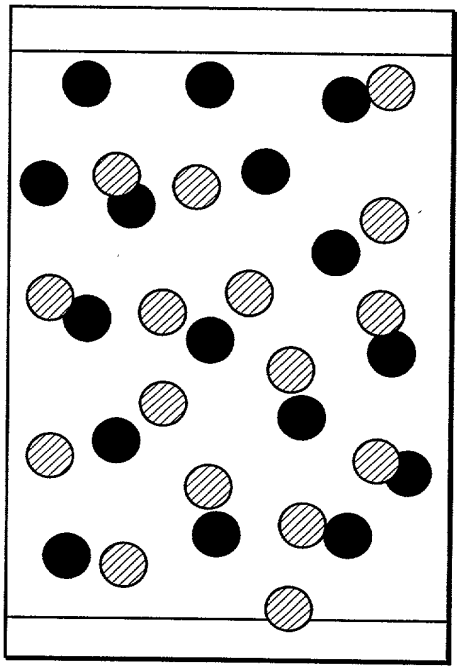
DOTS FORMED IN SECOND PASS

DOT FORMATION WITH USE OF BLUE NOISE
(HIGH FREQUENCY COMPONENTS)MASK



DOT FORMATION
WITHOUT FEEDING ERROR

FIG.32A

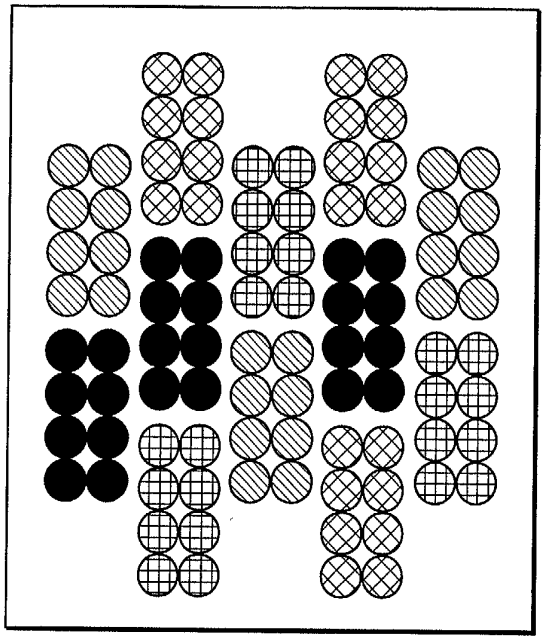


DOT FORMATION
WITH FEEDING ERROR

FIG.32B

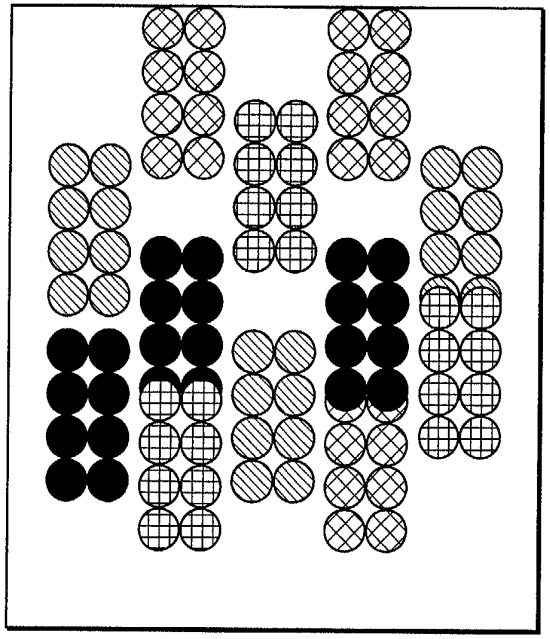
DOTS FORMED IN FIRST PASS

DOTS FORMED IN SECOND PASS



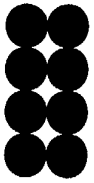
DOT FORMATION WITHOUT FEEDING ERROR

FIG.33A

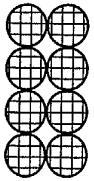


DOT FORMATION WITH FEEDING ERROR

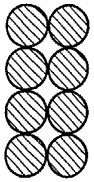
FIG.33B



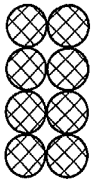
CYAN DOTS FORMED IN FIRST PASS



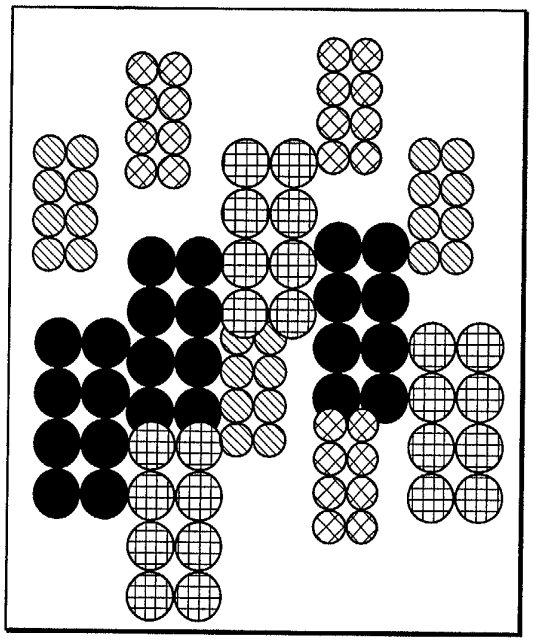
CYAN DOTS FORMED IN SECOND PASS



MAGENTA DOTS FORMED IN FIRST PASS

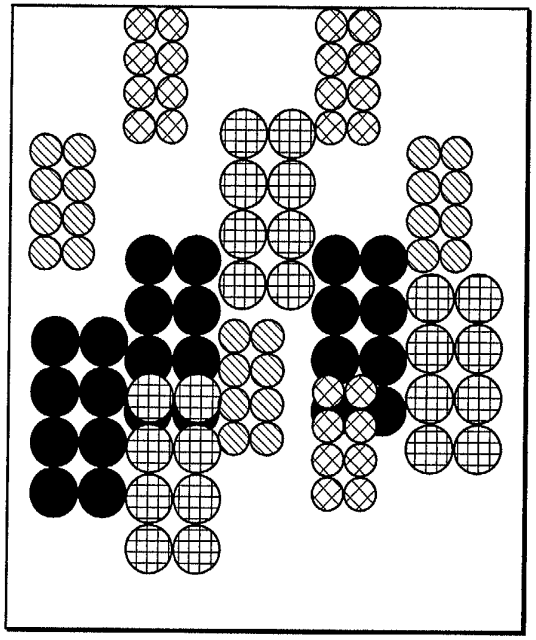


MAGENTA DOTS FORMED IN SECOND PASS



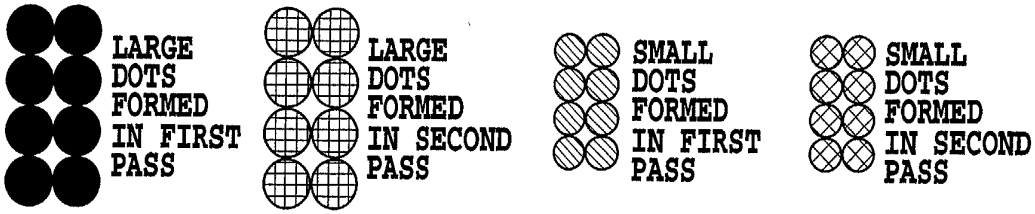
DOT FORMATION WITHOUT FEEDING ERROR

FIG.34A



DOT FORMATION WITH FEEDING ERROR

FIG.34B



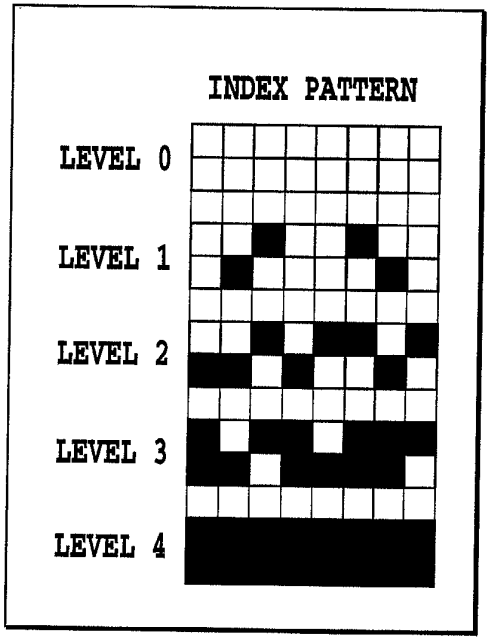


FIG.35A

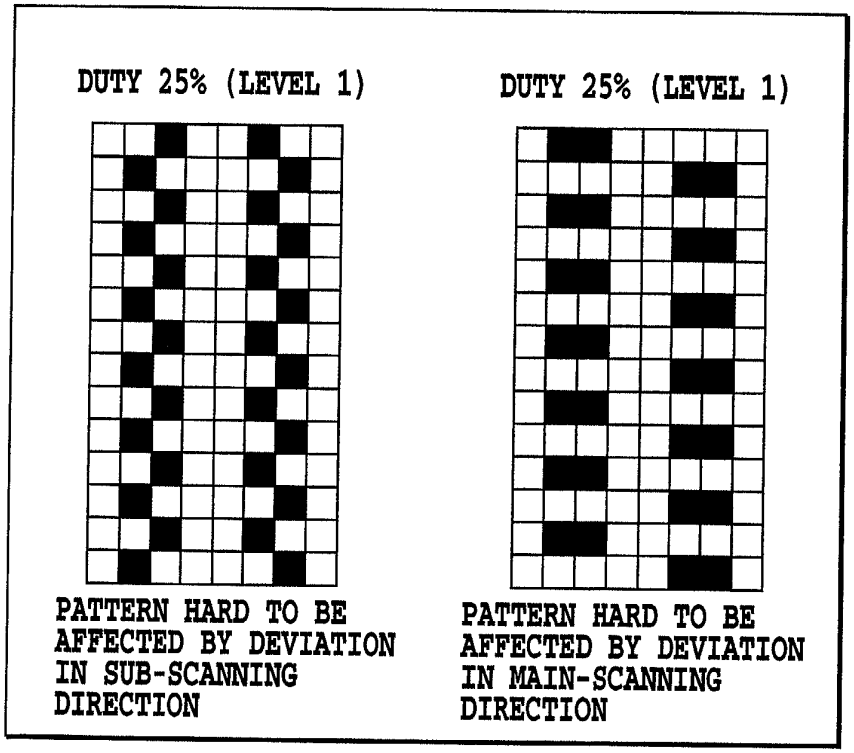


FIG.35B

NORMAL DIFFUSION COEFFICIENT

		*	7				
5	3	1	0				

FIG.36A

DIFFUSION COEFFICIENT USED FOR CASE OF LARGE DEVIATION IN MAIN-SCANNING DIRECTION

		*	7	5	3	2	1
8	6	5	4	3	2	1	0

FIG.36B

DIFFUSION COEFFICIENT USED FOR CASE OF LARGE DEVIATION IN SUB-SCANNING DIRECTION

		*	9	5	2	1	
8	6	5	4	3	1	1	
5	6	3	5	5	6	6	
4	4	3	4	4	5	5	
3	3	3	4	4	3	3	
1	2	6	7	8	9	0	

FIG.36C

* SUBJECT PIXEL

09/10/2001 10:52:20 09/10/2001

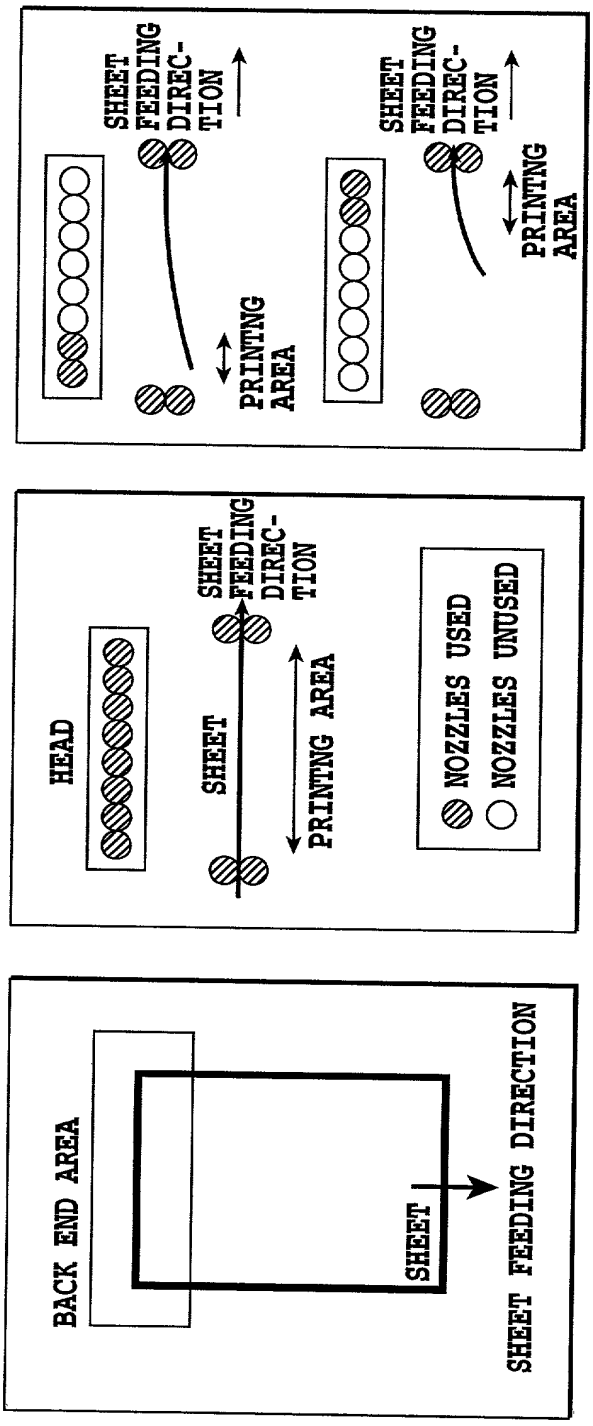


FIG.37A

FIG.37B

FIG.37C

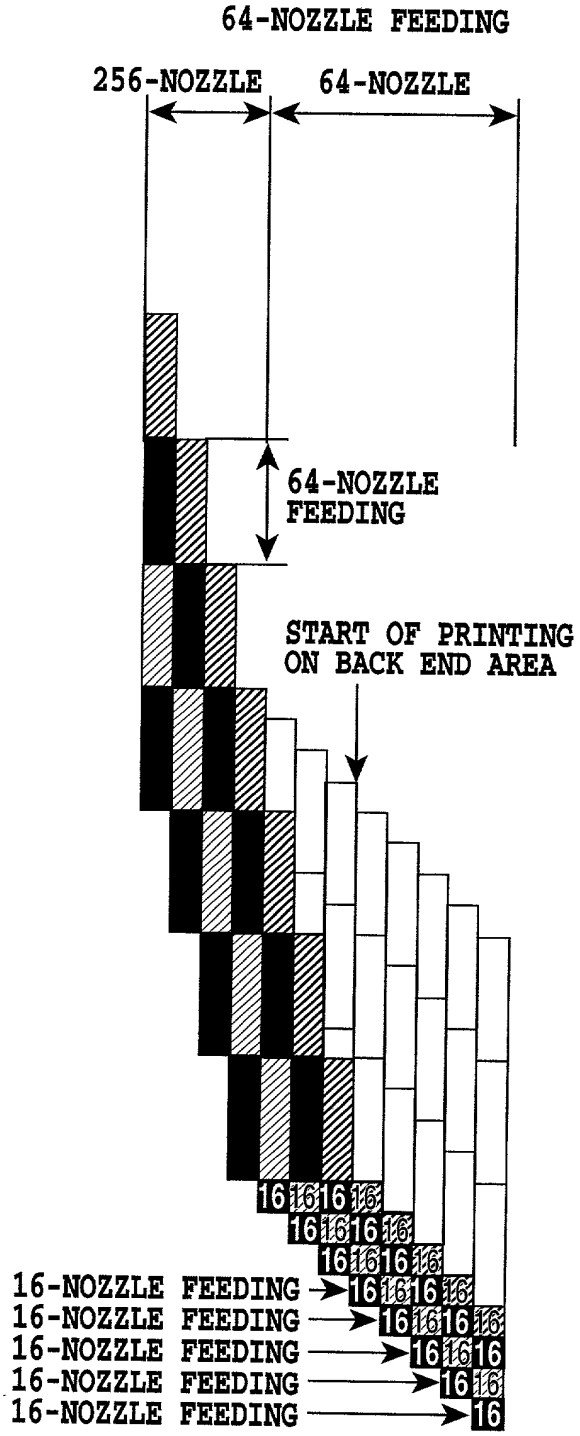

64-NOZZLE FEEDING
256-NOZZLE
64-NOZZLE
64-NOZZLE FEEDING
START OF PRINTING ON BACK END AREA
16-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING

FIG.38A

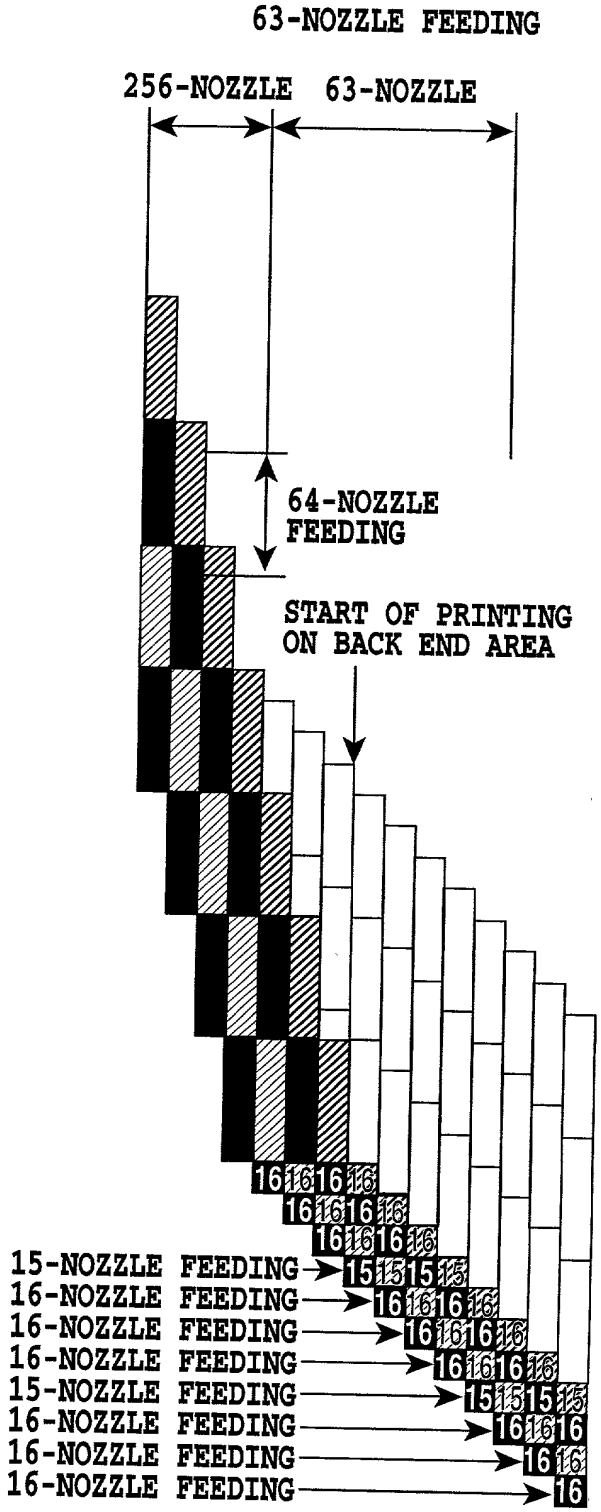

63-NOZZLE FEEDING
256-NOZZLE
63-NOZZLE
64-NOZZLE FEEDING
START OF PRINTING ON BACK END AREA
15-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING
15-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING
16-NOZZLE FEEDING

FIG.38B

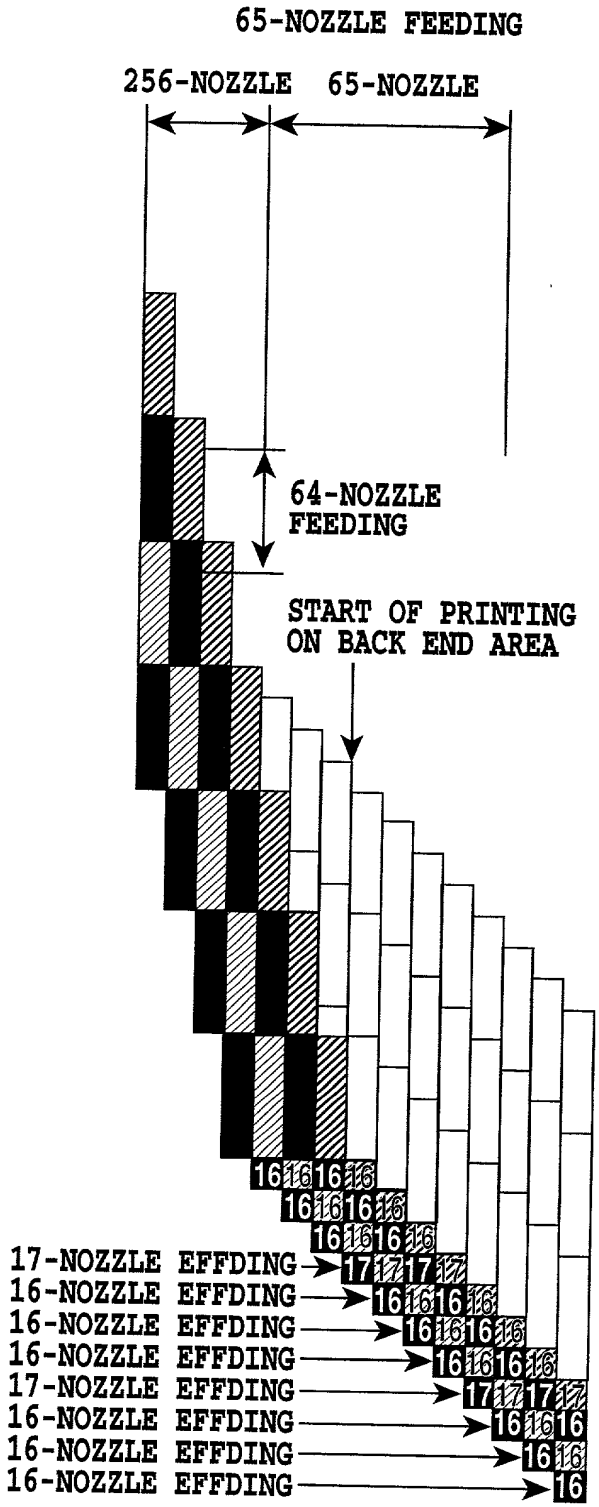

65-NOZZLE FEEDING
256-NOZZLE
65-NOZZLE
64-NOZZLE FEEDING
START OF PRINTING ON BACK END AREA
17-NOZZLE EFFDING
16-NOZZLE EFFDING
16-NOZZLE EFFDING
16-NOZZLE EFFDING
17-NOZZLE EFFDING
16-NOZZLE EFFDING
16-NOZZLE EFFDING
16-NOZZLE EFFDING

FIG.38C

FRONT END PROCESS (4-PASS)
64/256-NOZZLE FEEDING

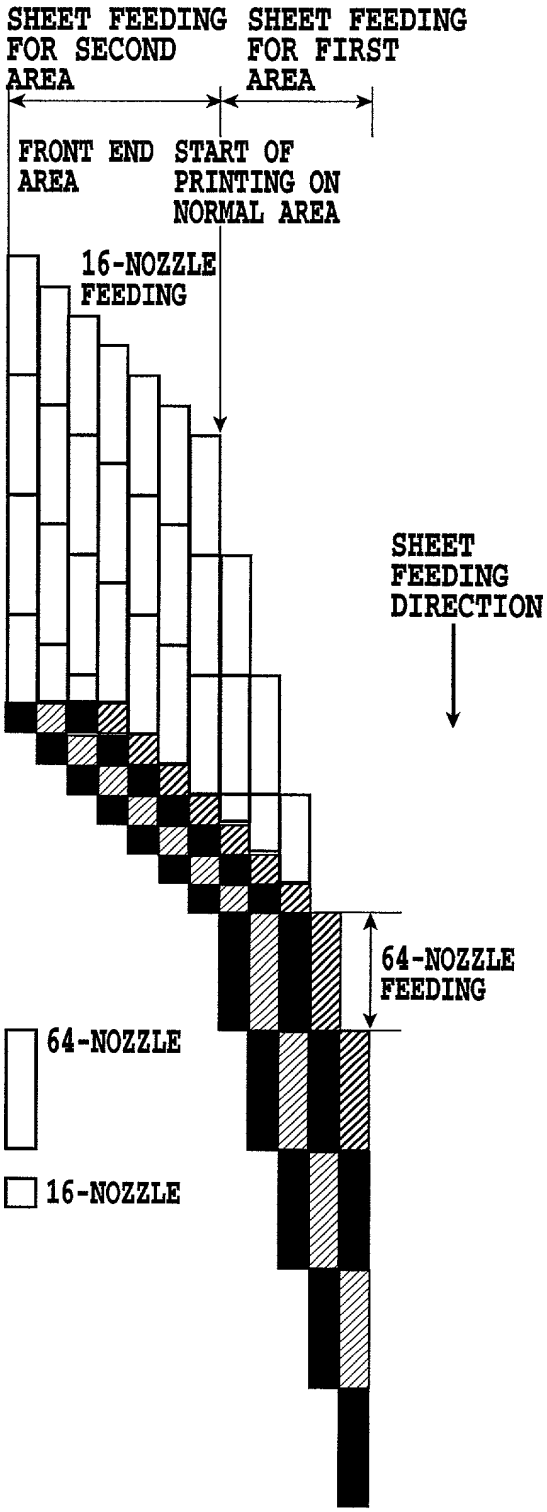


FIG.39A

BACK END PROCESS (4-PASS)
256/64-NOZZLE FEEDING

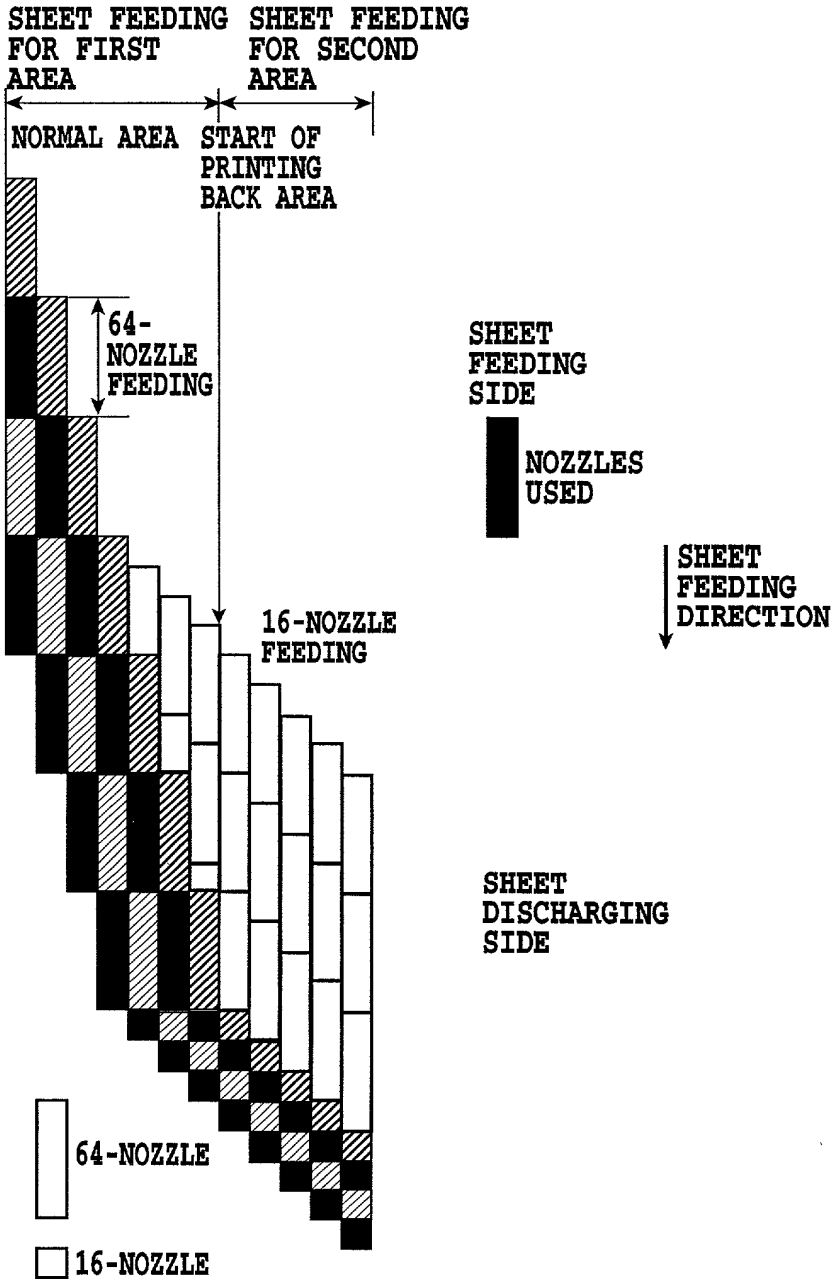


FIG.39B

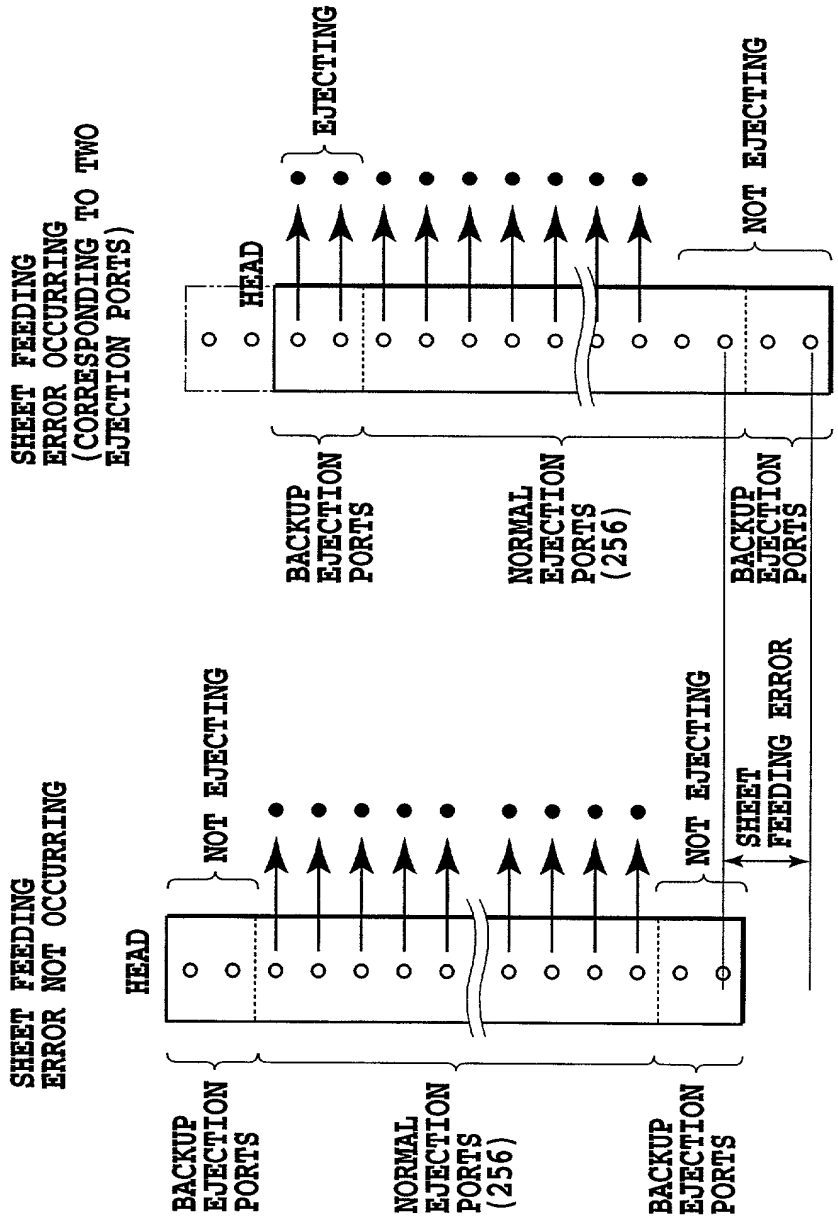

SHEET FEEDING ERROR NOT OCCURRING
HEAD
NOT EJECTING
BACKUP EJECTION PORTS
NORMAL EJECTION PORTS (256)
BACKUP EJECTION PORTS
NOT EJECTING
SHEET FEEDING ERROR
SHEET FEEDING ERROR OCCURRING (CORRESPONDING TO TWO EJECTION PORTS)
HEAD
EJECTING
BACKUP EJECTION PORTS
NORMAL EJECTION PORTS (256)
BACKUP EJECTION PORTS
NOT EJECTING

FIG.40

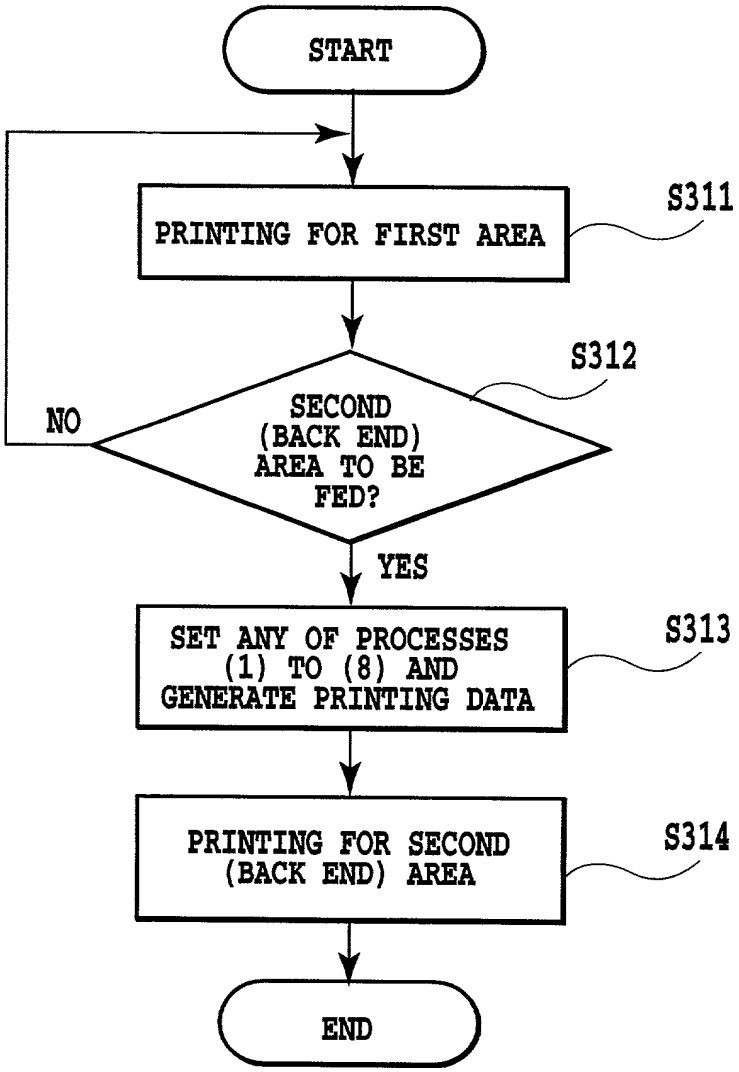

START
PRINTING FOR FIRST AREA
S311
S312
SECOND (BACK END) AREA TO BE FED?
NO
YES
SET ANY OF PROCESSES (1) TO (8) AND GENERATE PRINTING DATA
S313
PRINTING FOR SECOND (BACK END) AREA
S314
END

FIG.41

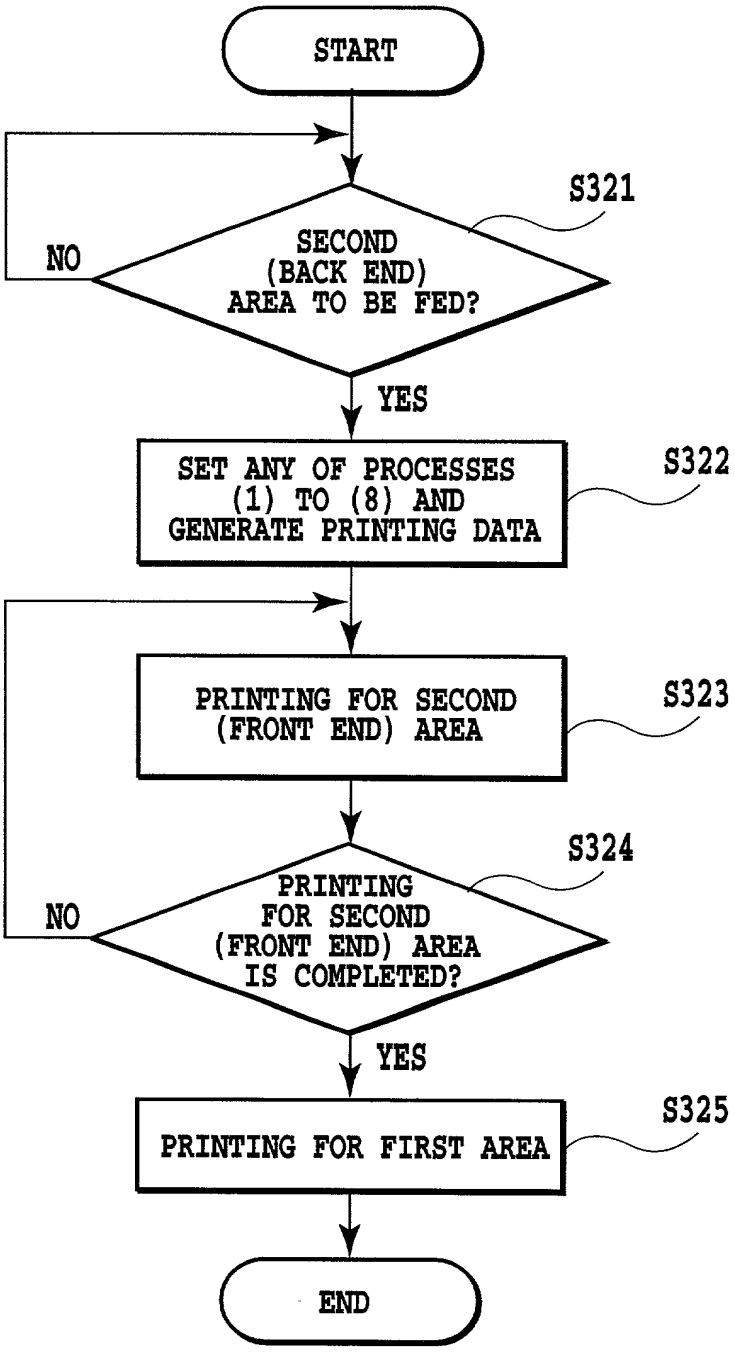

START
S321
SECOND (BACK END) AREA TO BE FED?
NO
YES
SET ANY OF PROCESSES (1) TO (8) AND GENERATE PRINTING DATA
S322
PRINTING FOR SECOND (FRONT END) AREA
S323
S324
PRINTING FOR SECOND (FRONT END) AREA IS COMPLETED?
NO
YES
S325
PRINTING FOR FIRST AREA
END

FIG.42

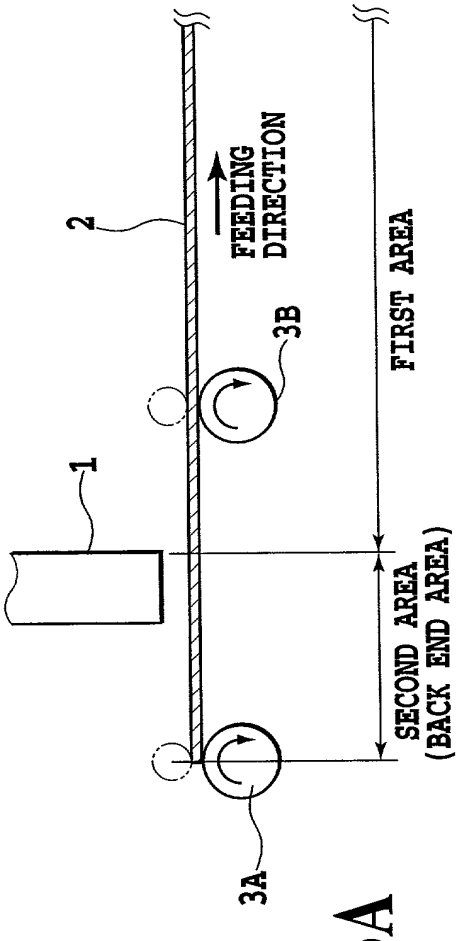


FIG.43A

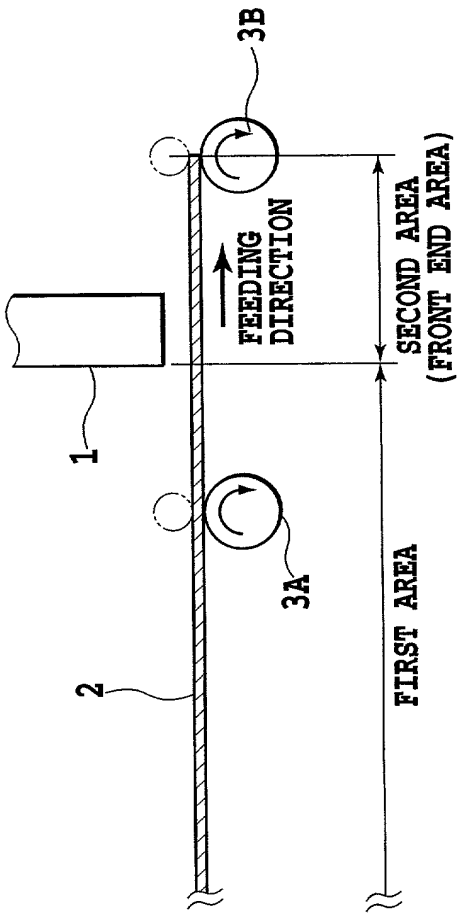


FIG.43B